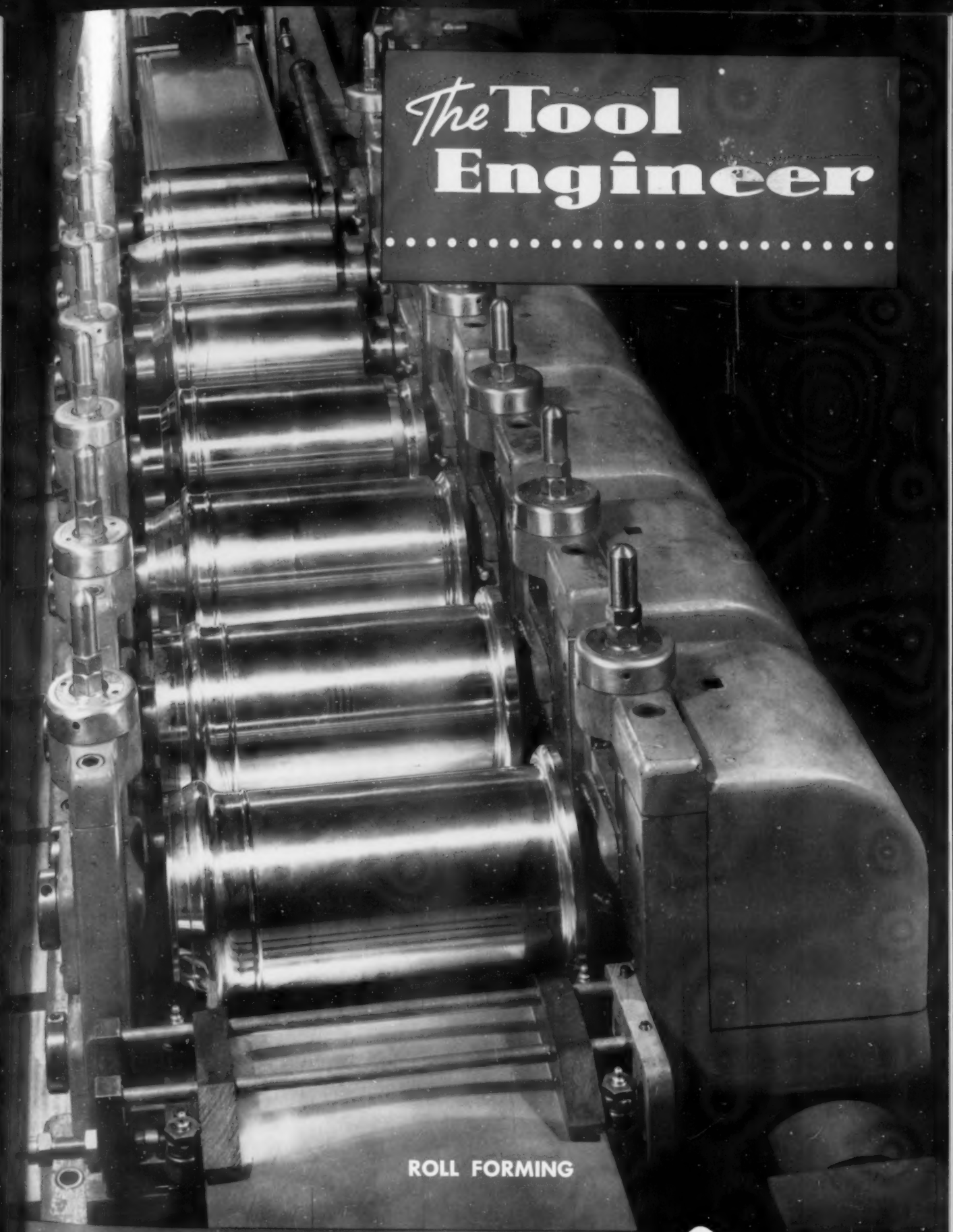


The Tool Engineer

ROLL FORMING

PUBLICATION OF THE AMERICAN SOCIETY OF TOOL ENGINEERS

OCTOBER, 1953

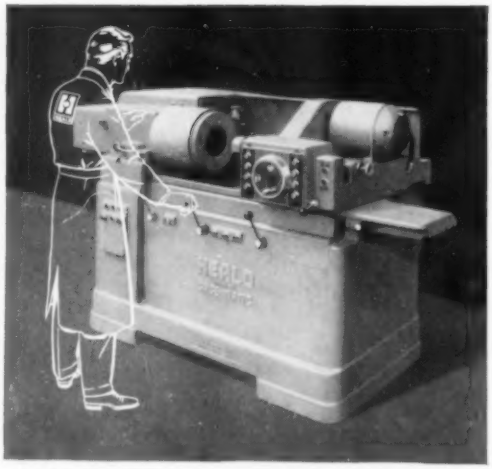
PLANNING ENGINEERING CONTROL OF TOOLING EQUIPMENT PRODUCTION



Cover: Prepainted aluminum

Heald Internal outproduces older equipment by nearly 2 to 1





This Heald Model 271 Gage-Matic grinds ring gear bores nearly as fast as two older machines.

THIS might be just another case history, except for one thing – a production increase of almost 100 per cent. And that's a pretty important saving in any production man's language.

A Heald Model 271 Gage-Matic was installed by an automotive manufacturer for grinding the bore of differential ring gears. A simple, straightforward operation – yet it was found that this new Internal out-produced *two* older machines by almost two-to-one! Why? Because all of the new Heald machines have been designed to save time and effort on *every phase* of the operating cycle. It all adds up to a substantial increase in production efficiency.

Remember – when it comes to precision finishing, it pays to come to Heald.

Internal and Rotary
Surface Grinding Machines
and Bore-Matics

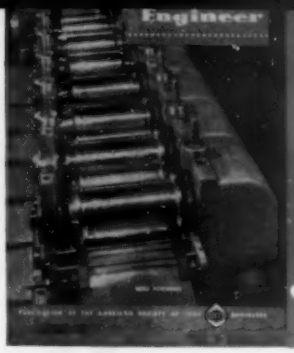
HEALD

THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

Offices in Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

Cover: Prepainted aluminum strip feeds from the foreground through forming rolls of a Yoder mill, is cut off to length by the scalloped blade of the flying shear and becomes siding for homes. Beginning on page 59, is an article describing a simple method for designing forming rolls.



The Tool Engineer

Volume XXXII, No. 4 October, 1953

TECHNICAL ARTICLES

Try it out on the Dog (Editorial) . . . . . *By Roger F. Waindle* 39

Engineers for Tomorrow . . . . . *By William M. Trevarrow* 41

Gadgets 46

- Press Guide . . . . . *By W. H. Saling*
- Short Run Die . . . . . *By Frank M. Butrick*
- Angular Drill Jig . . . . . *By F. E. Riley*
- Thread Milling on Drill Press . . . . . *By Frank Rozek*

Metal-Cutting Friction Coefficient Needs Reinterpretation . . . . . *By Dr. Max M. Kronenberg* 49

Wear of Carbide Tools—its Effect on Surface Finish and Dimensional Accuracy . . . . . *By A. J. Pekelharing and R. A. Schuermann* 51

Tool Steels Don't Just Happen . . . . . *By David P. Hughes* 58

Roll Forming—Simple Method for Designing Rolls . . . . . *By Elmer J. Vanderploeg* 59

Starch Solves a Tooling Problem . . . . . *By Robert S. Stanton* 66

Wire Thread Inserts—Design for Production . . . *By Paul E. Wolfe* 67

Tools at Work 74

Projection Drawing Prepared from Conventional Views 76

Tooling Takes to the Road . . . . . *By Harry B. Osborn, Jr.* 79

Analytical Methods for Deriving Cam Profiles . . *By Zbigniew Jania* 81

JIC Electrical Symbols (Reference Sheets) 89

ASTE NEWS

Chapters Wind Up Summer Activities . . . . *By Nancy L. Morgan* 91

DEPARTMENTS

Abstracts of Foreign Literature 141
Field Notes 147
Good Reading 158
Letter From the Editor..... 3
News in Metalworking.....100
NEWS in Industry 161
Technical Digests 131
Technical Shorts 143
Tools of Today 103
Trade Literature 152
Who's Meeting—and Where..164
Advertisers' Index 288

THE TOOL ENGINEER is regularly indexed in *The Industrial Arts Index.*

AMERICAN SOCIETY OF TOOL ENGINEERS

THE TOOL ENGINEER is published monthly in the interest of the members of the American Society of Tool Engineers. Entered as second-class matter, November 4, 1947, at the post office at Milwaukee, Wisconsin, under the Act of March 3, 1879. Yearly subscription for members, $2.00. Non-members, $6.00. Canada, $6.50; all other countries, $8.00 per year.

Copyright 1953 by the American Society of Tool Engineers.

OFFICE OF PUBLICATION: 239 E. Chicago St., Milwaukee, Wis.
EXECUTIVE AND EDITORIAL OFFICES: 10700 Puritan Ave., Detroit 21, Michigan.

Users report excellent results with New Sunicut S Oils

In just six months, these unique new straight cutting oils have "Job Proved" themselves as top performers in many metalworking shops all through the industry.

Reports like these keep coming in:

AN AUTO PARTS MANUFACTURER INFORMS US, "Threaded parts are as much as 50° cooler when they come off the machines. And our operators like the clear, clean, odorless qualities of Sunicut 102-S."

SCREW MACHINE SHOPS REPORT, "The versatility of Sunicut 209-S permits us to reduce the number of oils we must stock."

BROWN & SHARPE SCREW MACHINE OPERATORS SAY, "Sunicut 11-S increases tool life, gives finer finishes, eliminates staining problem."

LARGE IMPLEMENT MANUFACTURER TELLS US, "We get better finishes in our broaching operations with Sunicut 110-S, and our operators favor its light color."

Let us show you how these new Sunicut S Oils can help you. For technical bulletins or the services of a Sun representative, call your nearest Sun office or write SUN OIL COMPANY, Philadelphia 3, Pa., Department TE-10.

INDUSTRIAL PRODUCTS DEPARTMENT
SUN OIL COMPANY

SUNOCO®

PHILADELPHIA 3, PA. ♦ SUN OIL COMPANY LTD., TORONTO & MONTREAL

Harry E. Conrad
Executive Secretary
Allan Ray Putnam
Assistant Executive Secretary and Publishing Manager

Editorial

John W. Greve
Editor
Ralph H. Eshelman
Associate Editor
Robert A. Wason
Associate Editor
Dorothy J. Taylor
Assistant Editor
Alfred K. Abbott
Assistant Editor

Nancy L. Morgan
News Editor
Edith R. Saunders
Assistant News Editor

Michael Babala
Art Editor

Business

Clarence T. Etter
Advertising Manager
10700 Puritan Ave.
Detroit 21, Mich.

Austin G. Cragg
Eastern Advertising Manager
400 Madison Avenue
New York 17, N. Y.

Richard E. Cleary
Ohio Advertising Manager
Commercial Bank Bldg.
Berea, Ohio

Stanley F. Girard
Western Advertising Manager
540 North Michigan Ave.
Chicago 11, Ill.

W. R. McIntyre
Pacific Coast Advertising Representative
423 First Trust Bldg.
Pasadena 1, Calif.
Room 1085
681 Market St.
San Francisco, Calif.

Michael Jakesy
Production Manager
Fay H. LaRoue
Circulation Manager

THE TOOL ENGINEER
Publication of The American Society of Tool Engineers
10700 Puritan Ave.
Detroit 21, Mich.

The Tool Engineer

The Cost of Obsolescence

Probably the most thoroughly misunderstood and viciously misrepresented situation existing in our industrial economy has developed as a result of replacing obsolete production machines. As machines are conceived and built to do jobs better, cheaper and in less time than with existing equipment and methods, those machines should be employed. When the savings effected are such that they can amortize the cost of the machines within a reasonable time, all previous machines that performed the same operations are obsolete.

Whether or not a Certificate of Necessity is obtained by a manufacturer to relax Regulation TD-4422 which assumes that a machine is useful and profitable until some precise time in the future, the same arithmetic applies. The only difference is that an unfair burden has been placed as a penalty upon many progressive organizations. Obsolescence cannot be determined by a regulation specifying an arbitrary length of time.

The effect of the penalty makes some improvements in tools marginal in nature. In some cases this would be the straw to break the camel's back, stifling incentive. For the most part, however, it should prove a challenge to overcome the handicap imposed. There is no ceiling on inventiveness and genius. A tool can be improved so much that its use becomes mandatory.

More discouraging than any tax situation, harmful as it may be, is the fact that some labor leaders rail against machinery replacement as an evil. Yet intelligent replacement policies inevitably lead to higher wages and lower prices, the very goals of all labor organizations. This same sort of misunderstanding could lead to a damming of industry as a whole.

As understanding is achieved, good ought to result, reducing the cost of obsolescence accordingly.

John W. Greve

EDITOR

THEY CAN TAKE IT...and DO!
...and still maintain accuracy

STANDARD *Dial Indicators*

Built to stand the knocks—often unavoidable

NEW - with Years of Service Ahead



REGULAR
AGD SERIES

AGD SPECIFICATIONS THROUGHOUT

Made in 22 models including 4 dial diameters, 7 different graduations. Also 90° models (stem perpendicular to back). Long Range and Long Stem types.



***Decimatic* SERIES**

AGD SPECIFICATIONS except Range and Marking

For especially fine checking, extra high repeatability and accuracy. Marked in decimals. No whip of hand. 16 models.

This One Was New...
Years Ago -
Still Serviceable

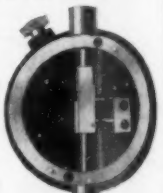


Obviously it has withstood hard usage, yet indicators such as these are constantly being reconditioned (at a fraction of the original cost) — to return still more dependable service to the owner.

You wouldn't treat your watch the way some indicators have to be treated. Standard Dial Indicators are built to give continuing accuracy while standing the knocks.

Outstanding Reason for the Durability Built into Standard Indicators is the

SHOCKPROOF MECHANISM



Proved by experience to prolong instrument life greatly, Standard's Shockproof Mechanism protects internal parts right from the spindle on. Furnished regularly in most models, not treated as an optional extra. Standard Indicators give longer, trouble-free life, need fewer repairs, are dependable. These facts add up to "Greater Economy."

STANDARD GAGE CO., Inc., Poughkeepsie, N.Y.

FOUR FEATURES THAT PAY OFF IN SIZE-CONTROL AND LONG LIFE

1 EXACT FLUTE SPACING

120°

HARDINGE
ELMIRA, N.Y.

PRECISION GROUND
Circular Cut-off Tools for
Brown & Sharpe Screw Machines



106 Standard Sizes
Decimal Blade Widths
Fractional Blade Widths

Hardinge Precision Ground Circular Cut-off Tools feature special steel, proper hardness, longer life, absolute accuracy, precision ground finish, standardized blade widths for various stock sizes, cut-off with or without chamfering, finish-gashed and sharpened ready for use.



Call for Sales and Service



OFFICES STOCKING HARDINGE CUT-OFF TOOLS

Hardinge Brothers, Inc.
544 West Washington Boulevard
Chicago 6, Illinois
PHONE: Randolph 6-5923

Hardinge Brothers, Inc.
70 Stratford Avenue
Dayton 2, Ohio
PHONE: MIchigan 6762

Hardinge Brothers, Inc.
4460 Cass Avenue
Detroit 1, Michigan
PHONE: TEmple 1-5413

Hardinge Brothers, Inc.
7 South Main Street
West Hartford, Connecticut
PHONE: 3-4291

Hardinge Brothers, Inc.
2711 East 11th St. at Soto
Los Angeles 23, California
PHONE: Angelus 1-0103

Milton Granquist Company
205 Washington Avenue, North
Minneapolis 1, Minnesota
PHONE: MAin 0934

Hardinge Brothers, Inc.
269 Lafayette Street
New York 12, New York
PHONE: WAlker 5-9677

Lee Horneyer Company
7 North Grand Boulevard
St. Louis 3, Missouri
PHONE: Lucas. 1223

Bues Production Equipment Co.
1416 - 46th Avenue
Oakland 1, California
PHONE: KEllogg 6-1181
ANdover 1-8376

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

FOUR FEATURES THAT PAY OFF IN SIZE-CONTROL AND LONG LIFE

are designed and built into all WINTER TAPS, resulting in

BALANCED Action

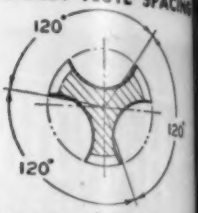


WINTER

WINTER BROTHERS COMPANY

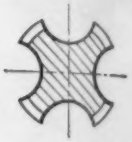
Rochester, Michigan, U. S. A. Distributors in principal cities. Branches in New York, Detroit, Chicago, Dallas, San Francisco. Division of National Twist Drill & Tool Co.

1 EXACT FLUTE SPACING



It is accomplished by high precision indexing.

2 UNIFORMITY OF FLUTE CONTOURS



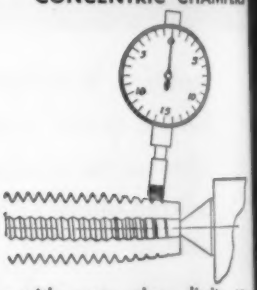
You can't get true Balanced Action without this.

3 PRECISION CHIP DRIVER CONTOURS

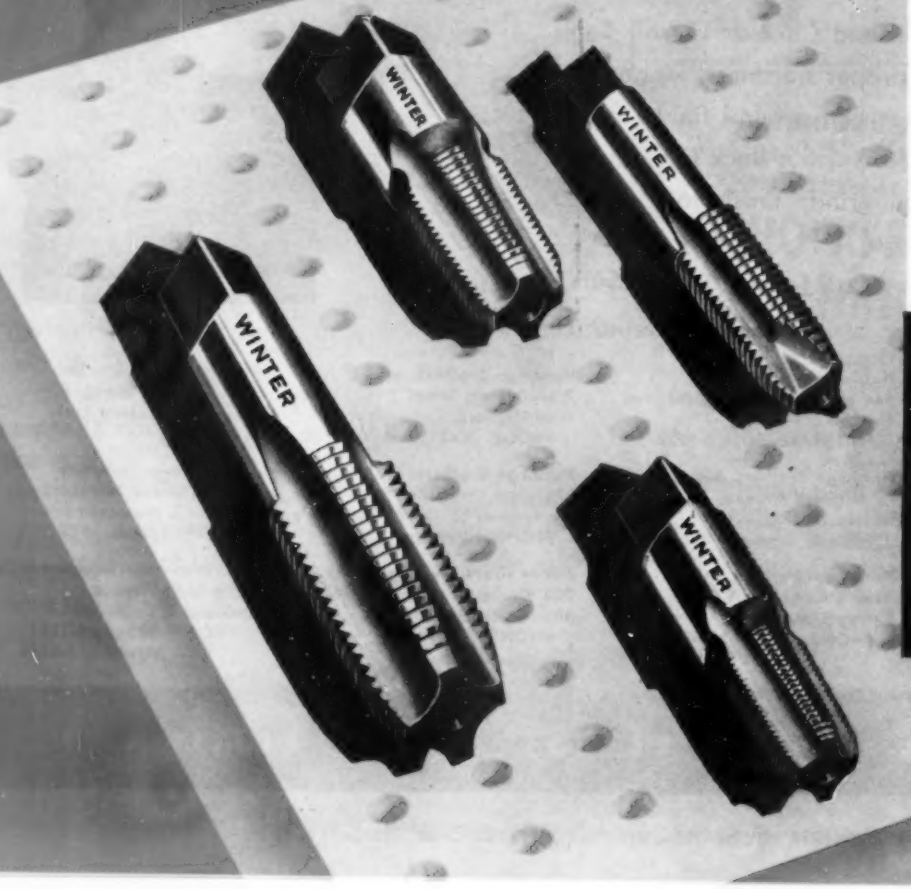


They are *exact* to size, shape, and position.

4 ACCURATE AND CONCENTRIC CHAMFERS



—with very close limits on shank and thread.



ALWAYS AT YOUR SERVICE



Your local industrial Supply Distributor carries complete stock of WINTER Taps.

HOW THE SLAYSMAN COMPANY

WITH HIGH HELIX ANGLES—

WITH *National* CUTTING EDGES

these "Helex" End Mills give long, faithful service. They're "smooth operators"—even when you push them with high speeds and feeds!

NATIONAL TWIST DRILL AND TOOL COMPANY

Rochester, Michigan, U. S. A. Distributors in principal cities.

Factory Branches: New York • Detroit • Chicago • Dallas • San Francisco



CALL YOUR INDUSTRIAL SUPPLY DISTRIBUTOR

. . . for all your staple industrial needs, including NATIONAL Twist Drills, Reamers, Counterbores, Milling Cutters, End Mills, Hobs and special tools.



All we did was to ask a simple question . . .

and E. J. Bowe *said* **"I have no complaints!"**

HOW THE SLAYSMAN COMPANY REDUCED THREADING TIME BY 97%

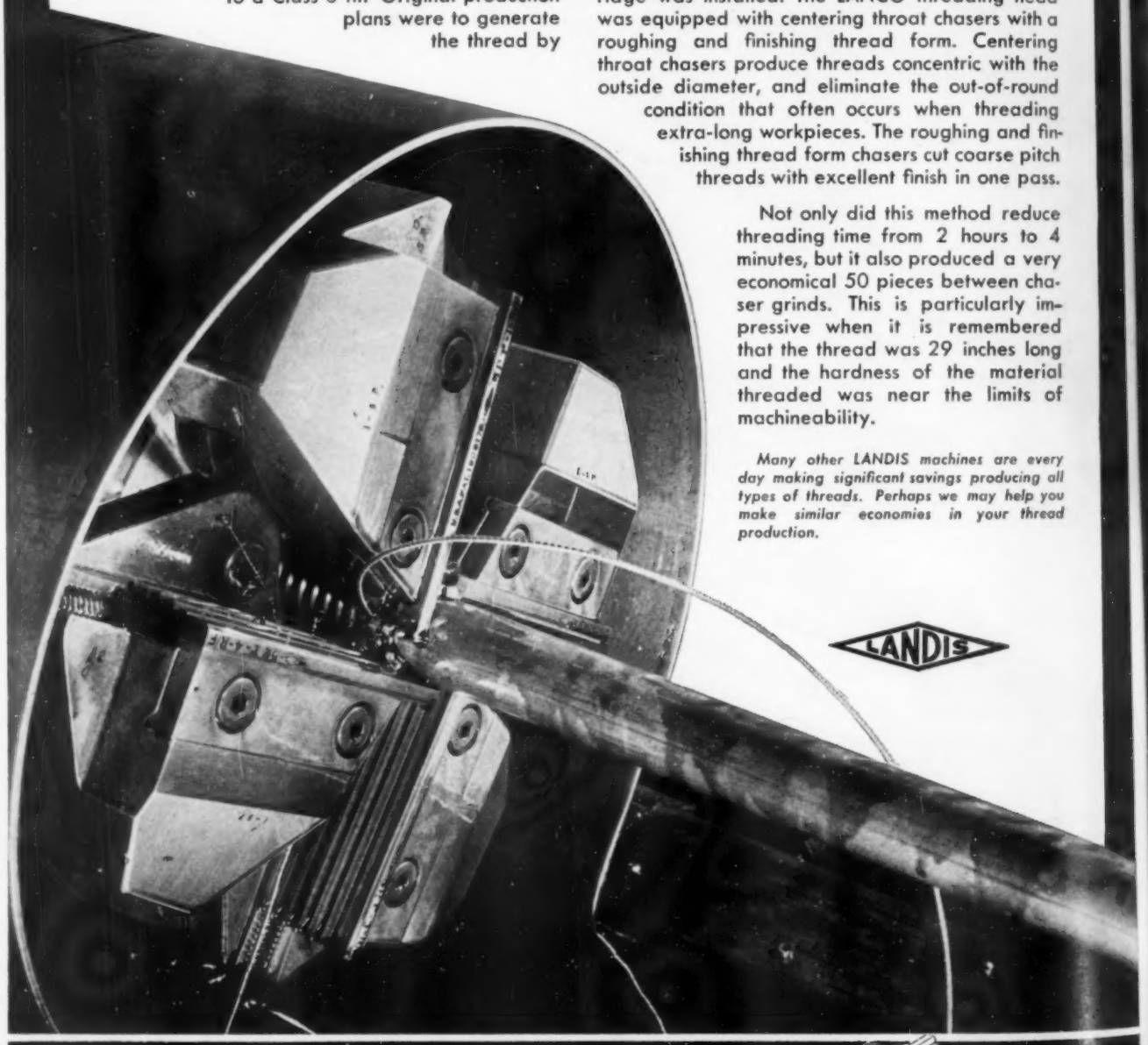
The Slaysman Company, a large machine shop and parts sub-contractor in Baltimore, reduced threading time on one contract operation from 2 hours to 4 minutes by the installation of a LANDMACO Threading Machine.

This contract required the cutting of a 1″ diameter 5 pitch Acme thread 29″ long on C1141 steel to a Class 3 fit. Original production plans were to generate the thread by milling. At the same time, even though the specifications and the hardness of the material seemed to preclude other methods, we were asked if we could suggest a more efficient threading process.

Based on our recommendation after studying the thread specifications, a 1½″ LANDMACO Single Head Leadscrew Machine with an extra-long carriage was installed. The LANCO threading head was equipped with centering throat chasers with a roughing and finishing thread form. Centering throat chasers produce threads concentric with the outside diameter, and eliminate the out-of-round condition that often occurs when threading extra-long workpieces. The roughing and finishing thread form chasers cut coarse pitch threads with excellent finish in one pass.

Not only did this method reduce threading time from 2 hours to 4 minutes, but it also produced a very economical 50 pieces between chaser grinds. This is particularly impressive when it is remembered that the thread was 29 inches long and the hardness of the material threaded was near the limits of machineability.

Many other LANDIS machines are every day making significant savings producing all types of threads. Perhaps we may help you make similar economies in your thread production.



LANDIS

THE LANDIS *Machine* CO. 50TH ANNIVERSARY WAYNESBORO PENNSYLVANIA

All we did was to ask a simple question . . .

and E. J. Bowe *said* **"I have no complaints!"**

We wanted to know how Ed was getting along with his battery of 8 of our No. 7 Hand Screw Machines, and the production superintendent of the well-known General R-F Fittings Co. of Boston said something we were mighty pleased to hear:

"We're in a highly competitive field, yet where quality of the part has to be of first consideration. I honestly think that without the help of the Wade No. 7 hand screw machine we never could turn out the large volume of R-F fittings that we do, and with hardly any down-time. We get no complaints from our operators, no complaints from our customers, and you'll get no complaints from me! I like these machines."



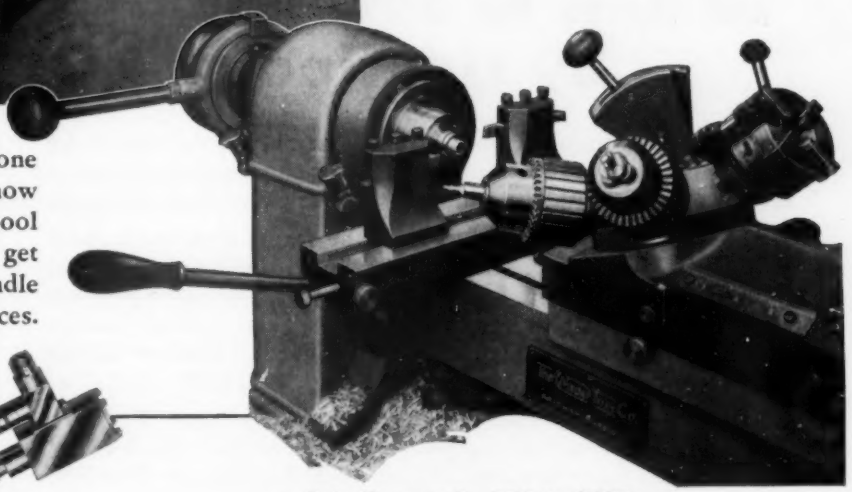
Wade no. 7

HAND SCREW MACHINES

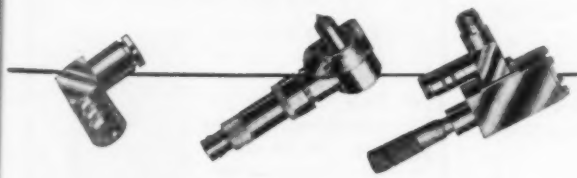
in operation at

GENERAL R-F FITTINGS CO., BOSTON

producers of standard and special co-ax connectors, cable assemblies, wavemeters, crystal mounts, dummy loads, directional couplers, and other microwave components.



Notice this efficient turret set-up for one of the *General R-F Fittings.* See how the cut-away case-hardened steel tool blocks permit the operator to get tools closer to the nose of the spindle and hold closer tolerances.



- **Spindle speeds, 315 to 3300 rpm**
- **1" collet 4-to-1 Hi-Lo Speeds at finger tips**
- **Spindle stops without stopping motor**

If you are doing long production runs on second operation work, and require the holding of close tolerances, we recommend that you write today for our descriptive catalog on the rugged, versatile No. 7 Hand Screw Machine. Address: 59 River Street.

THE WADE TOOL CO.

WALTHAM 54, MASS., U. S. A.

MAKERS OF PRECISION TOOLS FOR AMERICAN INDUSTRY

All we did was to ask a simple question . . .

HOW THE SLAYSMAN COMPANY REDUCED THREADING TIME BY 97%

The Slaysman Company, a large machine shop and parts sub-contractor in Baltimore, reduced threading time on one contract operation from 2 hours to 4 minutes by the installation of a LANDMACO Threading Machine.

This contract required the cutting of a 1″ diameter 5 pitch Acme thread 29″ long on C1141 steel to a Class 3 fit. Original production plans were to generate the thread by milling. At the same time, even though the specifications and the hardness of the material seemed to preclude other methods, we were asked if we could suggest a more efficient threading process.

Based on our recommendation after studying the thread specifications, a 1½″ LANDMACO Single Head Leadscrew Machine with an extra-long carriage was installed. The LANCO threading head was equipped with centering throat chasers with a roughing and finishing thread form. Centering throat chasers produce threads concentric with the outside diameter, and eliminate the out-of-round condition that often occurs when threading extra-long workpieces. The roughing and finishing thread form chasers cut coarse pitch threads with excellent finish in one pass.

Not only did this method reduce threading time from 2 hours to 4 minutes, but it also produced a very economical 50 pieces between chaser grinds. This is particularly impressive when it is remembered that the thread was 29 inches long and the hardness of the material threaded was near the limits of machineability.

Many other LANDIS machines are every day making significant savings producing all types of threads. Perhaps we may help you make similar economies in your thread production.



LANDIS

THE LANDIS *Machine* CO. 50TH ANNIVERSARY 50 WAYNESBORO PENNSYLVANIA

320

All we did was to ask a simple question . . .

and E. J. Bowe *said* **"I have no complaints!"**

We wanted to know how Ed was getting along with his battery of 8 of our No. 7 Hand Screw Machines, and the production superintendent of the well-known General R-F Fittings Co. of Boston said something we were mighty pleased to hear:

"We're in a highly competitive field, yet where quality of the part has to be of first consideration. I honestly think that without the help of the Wade No. 7 hand screw machine we never could turn out the large volume of R-F fittings that we do, and with hardly any down-time. We get no complaints from our operators, no complaints from our customers, and you'll get no complaints from me! I like these machines."



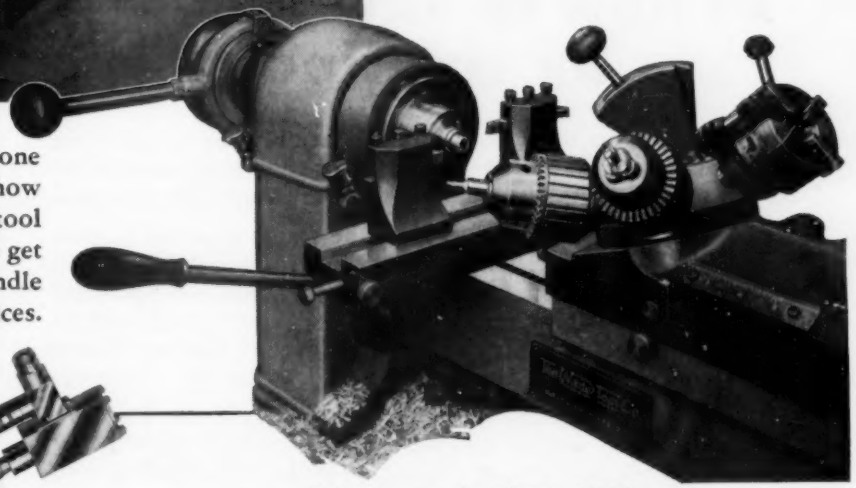
Wade no. 7

HAND SCREW MACHINES

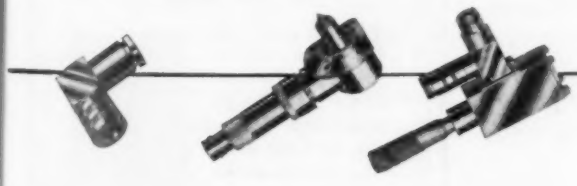
in operation at

GENERAL R-F FITTINGS CO., BOSTON

producers of standard and special co-ax connectors, cable assemblies, wavemeters, crystal mounts, dummy loads, directional couplers, and other microwave components.



Notice this efficient turret set-up for one of the *General R-F Fittings.* See how the cut-away case-hardened steel tool blocks permit the operator to get tools closer to the nose of the spindle and hold closer tolerances.



- **Spindle speeds, 315 to 3300 rpm**
- **1" collet 4-to-1 Hi-Lo Speeds at finger tips**
- **Spindle stops without stopping motor**

If you are doing long production runs on second operation work, and require the holding of close tolerances, we recommend that you write today for our descriptive catalog on the rugged, versatile No. 7 Hand Screw Machine. Address: 59 River Street.

THE WADE TOOL CO.

WALTHAM 54, MASS., U. S. A.

MAKERS OF PRECISION TOOLS FOR AMERICAN INDUSTRY



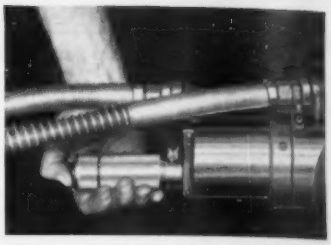
ACTION PICTURE
of how to save money by riveting!

This action photo, taken on the frame assembly line in one of the largest auto factories, illustrates how cost-conscious manufacturers save money with Hannifin "Hy-Power" Hydraulic Riveters.

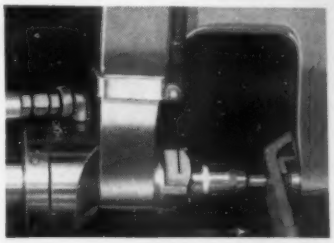
First step in assembly is to rivet the frame together...with Hannifin "Hy-Power" Riveters. The light-weight forged C-Frames hang from balancers within easy reach of each operator. No special skill is required to head the ⅜" rivets, cold, each in seconds. What's more, this "silent squeeze" method forms stronger, more uniform rivets, hot or cold.

Power source is the Hannifin "Hy-Power" Hydraulic Pressure Generator which quietly supplies pressure to the "Hy-Power" Cylinder that does the work. These riveters are available in 7½, 10, 12½, 17½, 25, 35, 50, 75 and 100-ton capacities.

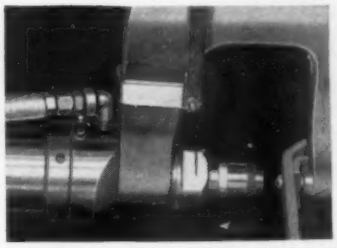
here's the HANNIFIN "HY-POWER" WORK CYCLE



In position. A single control button starts (or interrupts) the automatic Hy-Power cycle.



Ram approaches fast, then hydraulic pressure automatically intensifies, and the rivet head is formed.



Fast, automatic return. Total elapsed time to head a rivet is only 2 to 3 seconds.

"HY-POWER" CAN ALSO BE USED IN MULTIPLE TO SET SEVERAL RIVETS

Bulletin 150 tells how to save money on riveting, staking, punching, forming and bending operations. Write for copy.



do ALL you can do...with

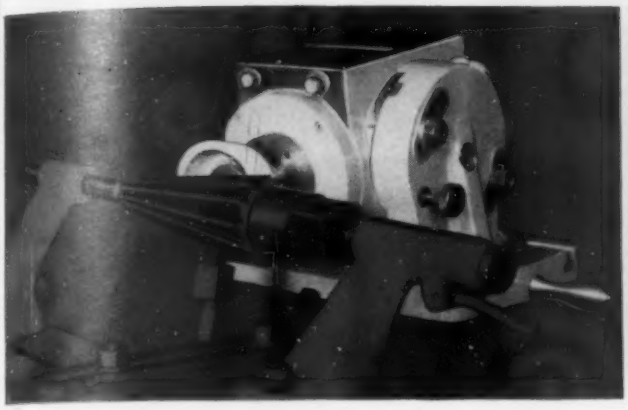
HANNIFIN

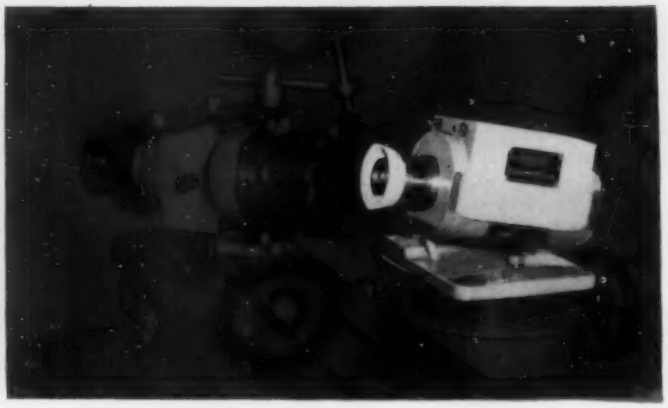
Hannifin Corporation, 1119 S. Kilbourn Ave., Chicago 24, Ill.

Air and Hydraulic Cylinders • Hydraulic Presses • Pneumatic Presses • "Hy-Power" Hydraulics • Air Control Valves

Specify THIS NEW POPE SUPER PRECISION 1 HP, 3600 RPM MOTORIZED TOOL AND CUTTER GRINDER CLEARANCE ANGLE SWIVELLING HEAD

With Angular Adjustment In A Vertical Plane





TIME AND MONEY SAVING FEATURES:

1. Cup wheels, generally considered best for cutter grinding, can be used for practically all clearance angles on this new head.
2. Cup wheels produce a cutting edge on tools that lasts longer because it is stronger.
3. The tooth rest remains on the center line of the cutter for practically all grinding on centers or in the work head.
4. Most cutters and reamers can be ground all over with one set-up, using the swivelling table and Pope tilting head. The usual second and third set-ups are no longer required.
5. All clearance angles read directly in degrees from the scale provided on the head. Mistakes on clearance angles are avoided.
6. The right clearance angle is assured on tools difficult to grind, such as slab mills, taper reamers, angular cutters and form tools.
7. 3600 R.P.M. — one wheel speed — safe for all wheels generally used on cutter grinders. Heat checking of cutters is virtually eliminated.
8. The operating ease and convenience of this new Pope Head with the angular adjustment in the vertical plane saves you time and money on every tool you grind.

ASK FOR COMPLETE SPECIFICATIONS

No. 96

Specify POPE® PRECISION SPINDLES

POPE MACHINERY CORPORATION
Established 1920
261 RIVER STREET · HAVERHILL, MASSACHUSETTS



The new B9 is as fast-cutting as they make 'em. Adaptable to speeds up to 16,000 surface feet per minute, the new Norton B9 cut-off wheel is a real production booster. Resinoid bonded and available with either smooth sides, or with the rougher "F" sides for greater chip clearance, it's a cool-cutting, non-burning performer on all types of metals.

Add the "TOUCH of GOLD" to all your cut-off jobs

Your cutting-off jobs may involve ferrous or non-ferrous metals of any degree of hardness — or non-metals ranging from rubber hose to marble. Your machines may be high speed or low speed — swing frame, chopper, traverse, floor stand or portable. The point to remember is:

With the right Norton cut-off wheel you're sure of the fast, safe, clean-cutting performance that adds the profit-boosting "Touch of Gold" to every job.

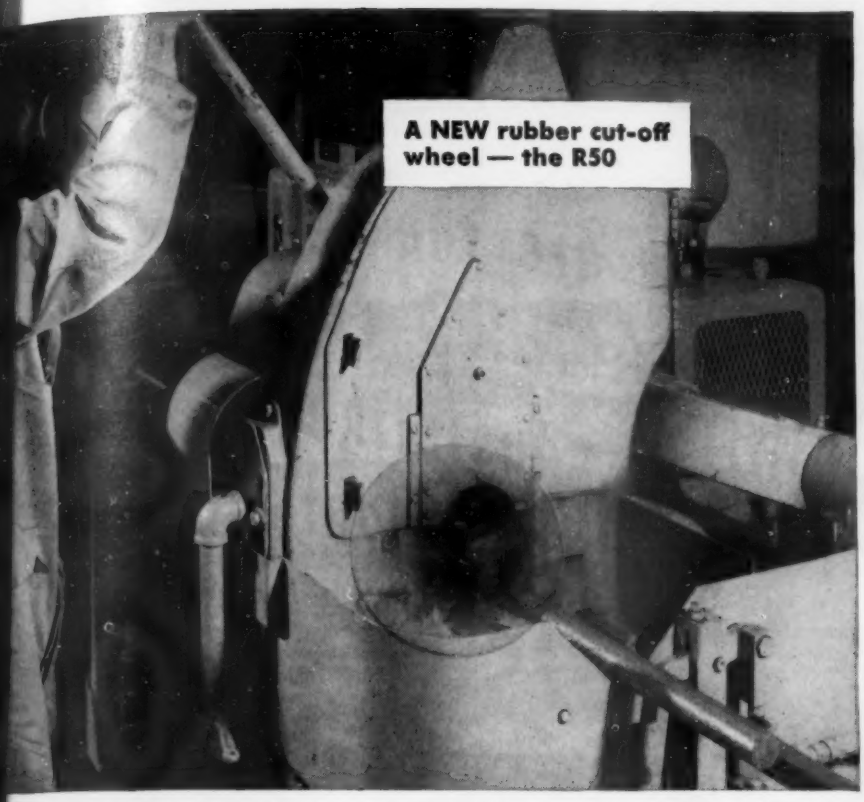
Norton cut-off wheels are made with resinoid, rubber and shellac bonds, in ALUNDUM* (aluminum oxide) abrasive and CRYSTOLON* (silicon carbide) abrasive, and in a complete range of sizes. Whatever its type, you can count on every Norton cut-off wheel for the easy handling and exceptional breakage-resistance that mean happier operators and higher production.

Your Norton distributor will be glad to recommend the *right* cut-off wheels for your jobs. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed under "Grinding Wheels" in your phone directory yellow pages. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

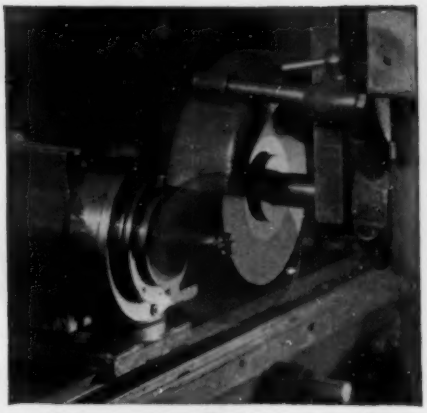
NORTON
ABRASIVES

Making better products . . . to make other products better

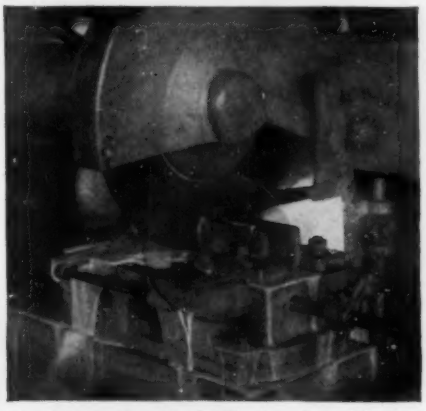
*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries



The new R50 has built-in chip clearance. Designed primarily for wet-cutting of metal bar stock, this new Norton rubber bonded cut-off wheel handles diameters up to 2½" on chopper machines and up to 6" on oscillating machines. Built-in chip clearance, unusual in this type of wheel, is one of the reasons why the R50 cuts freer and cooler, without case hardening the ends of the stock.



The B2 is versatile. Handy as a general purpose cut-off wheel for the tool room, the Norton resinoid bonded B2 is also used for lighter jobs on plastics, marble, carbon, brake lining and other non-metals.



The R30 is standard. The bond used in the Norton R30 is the standard rubber bond for smaller wheels and is preferred for jobs such as cutting-off thin tubing, small diameter work and fine slotting.



The BN covers a wide job-range. You can't beat the long popular Norton BN wheel for general, all-around usefulness. Or for safety either, because the strong reinforcement of this resinoid bonded wheel practically eliminates breakage from the cutting-off picture. Uses include: notching, slotting and cutting-off gates and risers from non-ferrous castings; cutting wire rope; slotting railway track welds; tuck pointing; cutting non-metallic materials such as fibre board, concrete, tile, plastics, and the like.



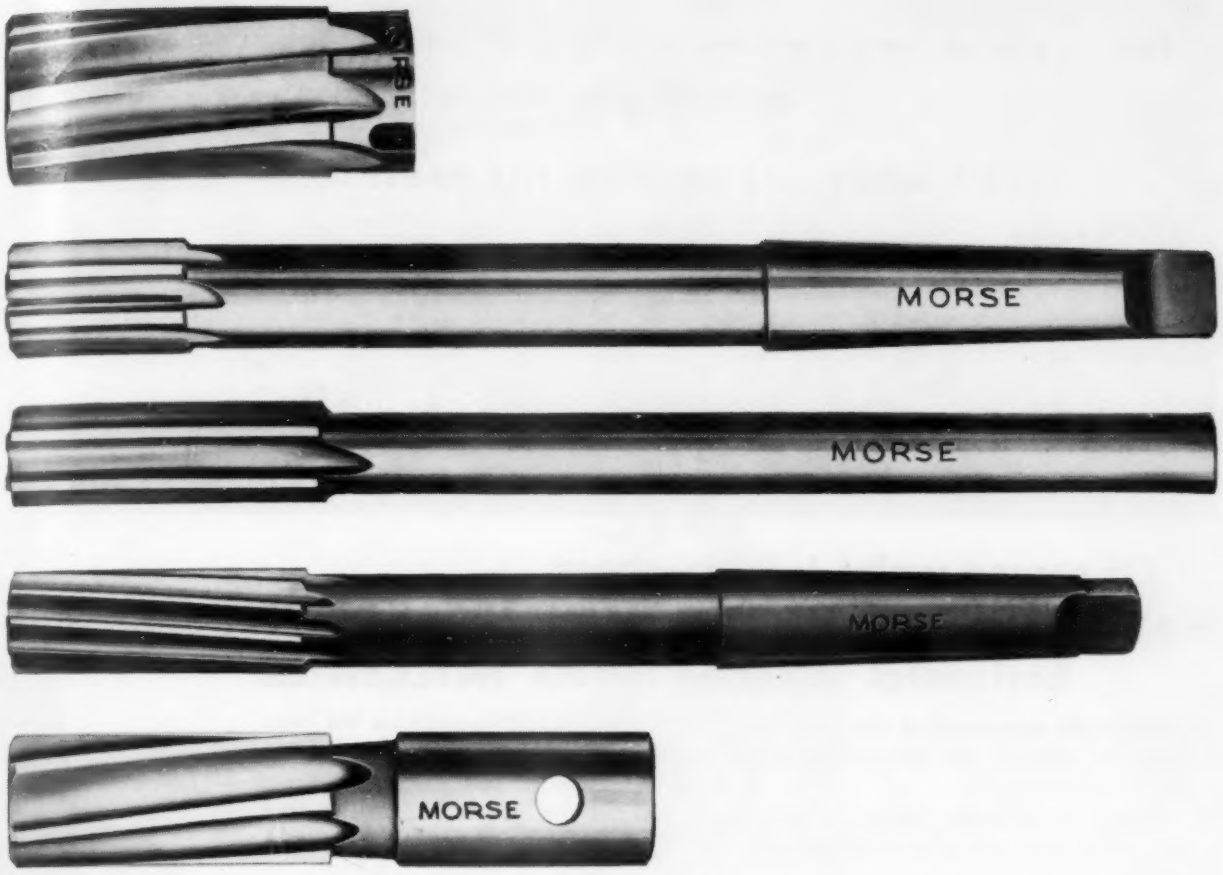
The R20 is rugged. A very durable wheel, the Norton R20 has the strongest of rubber bonds. An ideal wheel for dry-cutting of metal rods and other jobs where dressing action is particularly severe.

W—1520

"How are these
MORSE REAMERS working out?
SWELL — just like you
said they would!"



MORSE



See your Morse-Franchised Distributor about

MORSE REAMERS

for "Top-Hole" performance on every job

Staggered flute-spacing is the payoff feature of Morse Reamers. It ends biting, slipping . . . gives you smooth cutting and *accurate hole-sizing every time.* Chips are cleared freely, with no galling or scoring of the surface.

Morse makes *all* types of Reamers, for ferrous and non-ferrous . . . including the Morse Expanding Chucking Reamer which can be reground again and again . . . and even including the huge tools used in bridge and structural work. What's more, you can get Morse Reamers *Electrolized* for extra life, if you wish.

Talk it over with your Morse-Franchised Distributor . . . he's got the know-how and the stock to start you toward better work and greater savings than you ever expected from this type of cutting tool. *Call him today.* He'll give you your first saving (in time) right now.

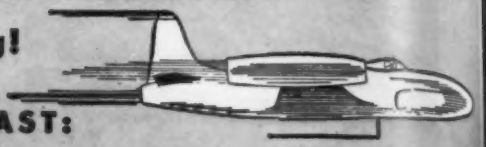
MORSE TWIST DRILL & MACHINE COMPANY
NEW BEDFORD, MASSACHUSETTS
(Division of VAN NORMAN CO.)
Warehouses in New York, Chicago, Detroit, Houston, San Francisco

Cutting Tools

Buy them by phone from your Morse-Franchised Distributor and save ordering time

today, you're hardly aware of any **SPEED LIMIT** *

on surface broaching!



BUT HERE'S WHAT IT'S BEEN IN THE PAST:

6 fpm 1902

25 fpm 1922

60 fpm 1942

today 300 fpm . . . and more!

*Of course we're talking about the new LAPOINTE ELECTRO-MECHANICAL DRIVE horizontal BROACHING MACHINE

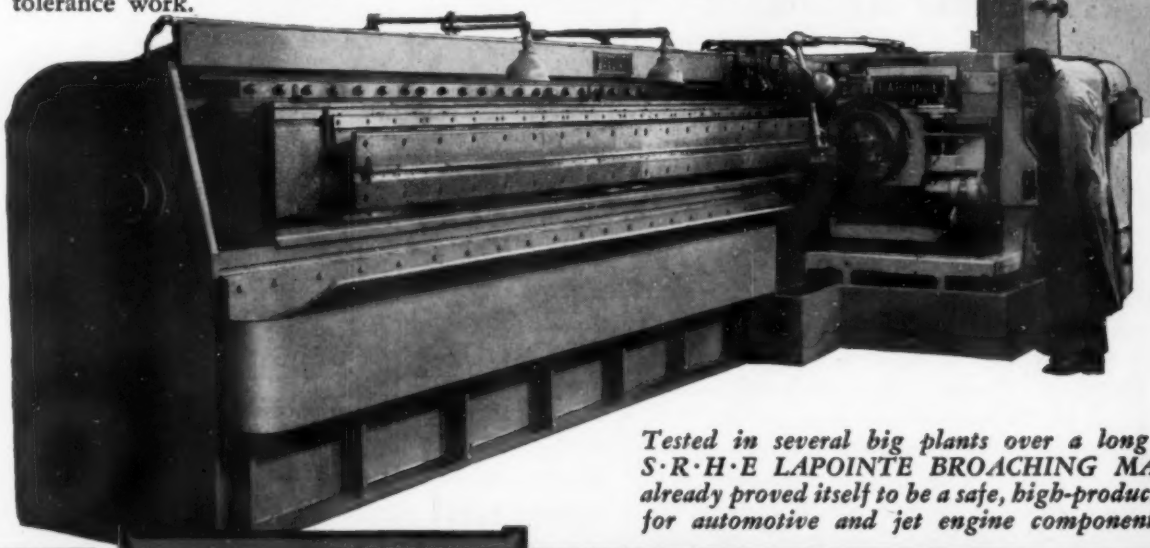
Enthusiastic approval of this new LAPOINTE BROACHING machine has been given by some of the best people — and best plants — in America! How? *They said it with orders!*

These orders came, because some plants wanted the greater flexibility and versatility now available through the Dual Speed and Dual Cycle (patented) features;

Some plants needed the higher production now possible in a modern high-speed broaching machine;

And all plants were delighted to know about the longer strokes that were available, **100" to 180"**, providing single pass broaching operations for close tolerance work.

Write for new Technical Bulletin SRHE-5



Tested in several big plants over a long period, the S·R·H·E LAPOINTE BROACHING MACHINE has already proved itself to be a safe, high-production machine for automotive and jet engine components especially.

THE LAPOINTE MACHINE TOOL COMPANY

HUDSON, MASSACHUSETTS • U. S. A.

In England: Watford, Hertfordshire

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES



PROPER SELECTION



BRINGS RESULTS



Remember "The
Threadwell F

Conversion Table of Std. Tap
Tap Net Price Li
Distributor Promotion
Technical Reference
Tap Manuals

THREADWELL NEW TAP SELECTOR

BRINGS RESULTS, TOO

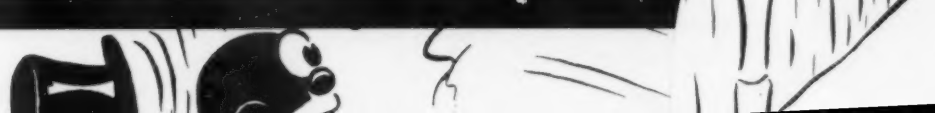
The Pocket Tap Selector illustrated full size on the opposite page has been designed and produced by Threadwell to assist tap users everywhere in the selection of the tap which will give maximum production on any tapping job.

The information speaks for itself. Prepared in accordance with the latest Unified and American Screw Thread data, the Threadwell Tap Selector is the most complete and comprehensive ever devised. You won't believe it until you see it! It is absolutely FREE and can be had for the asking from any Threadwell Distributor.

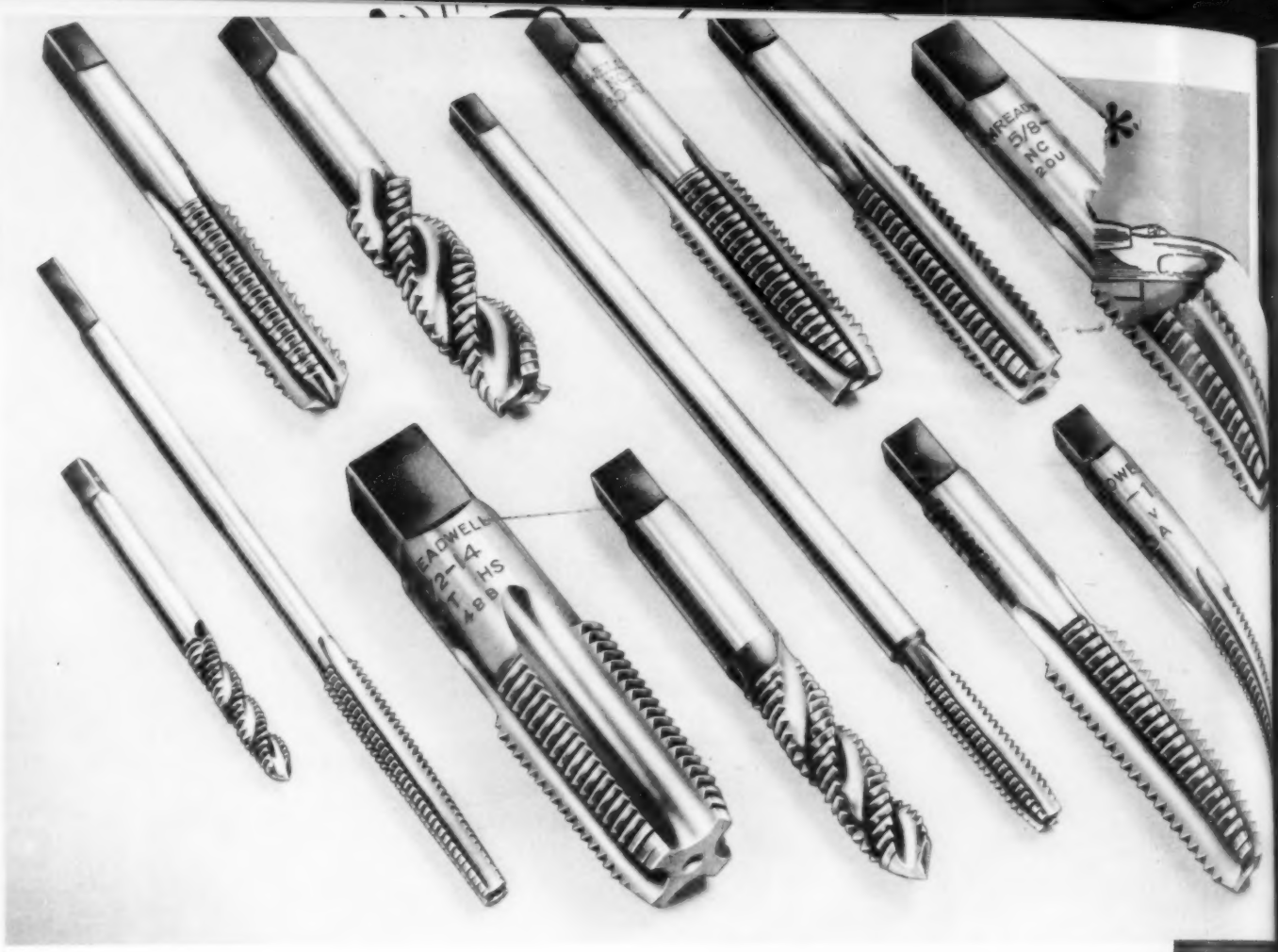
You can boost production now by selecting the proper tap for the job . . . and to keep production boosted make sure the tap you select is Threadwell.

if you want results . . .

. . . SELECT THREADWELL




mber There Other
eadwell Firsts?
able of Std. Tap Catalog Nos.
ap Net Price Lists
butor Promotional Kit
ical Reference Charts
Tap Manuals
FRACTIONAL SIZE TAP SELECTOR
MACHINE SCREW TAP SELECTOR
Threadwell
Presented with the compliments of
THREADWELL TAP & DIE CO. Greenfield, Mass.
and YOUR THREADWELL DISTRIBUTOR
TAP & DIE CO. GREENFIELD,
Threadwell



THE FINEST IN TAPS.....

Threadwell Taps are universally accepted and specified by users who know fine cutting tools.

They know that Threadwell Taps have more built-in features without a cent of additional cost.

Users like Threadwell's ground radial relief for free and easy tapping operations. Ground and polished flutes, too, permit a quick clean job. Maximum uniformity is obtained through Threadwell's unique method of heat treatment which eliminates decarburization.

Users know, too, that every Threadwell Tap is under constant gaging and inspection during each step of its manufacture. They know they can save time and money by asking for Threadwell in the first place.

Threadwell

THREADWELL TAP & DIE CO.
Greenfield, Mass.

Form No. T-239

Printed in U.S.A.





Polaroid's "picture-in-a-minute" camera depends on BRASS

nap the shutter on the famed Polaroid *and* camera and a minute later you n have the processed, finished print. When the Polaroid camera goes into ction, a lot of precision-made brass arts go along with it. Each is of the mposition, form, temper and finish ost suitable for the purpose. Each contributes its share to a longer service life because of its durability, and its resistance to wear, fatigue and corrosion.

Little wonder that so many instrument makers depend on Brass...with so much of it from the mills of The American Brass Company. 6388

THE AMERICAN BRASS COMPANY
General Offices, Waterbury, Conn.
In Canada: Anaconda American Brass Ltd., New Toronto, Ontario.

MAKERS OF

ANACONDA®
COPPER, BRASS & BRONZE

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-21

MACHINE STAMPING AND EMBOSSING DIES

Higher production with CADILLAC Dies is assured by special steel selection, controlled heat treatment and precision engraving — noted for accuracy and high quality. We'll be glad to advise you on best marking methods.



PUNCH PRESS DIE



ROLL SEGMENT DIE



SOLID ROLL DIE

HEAVY BEVEL STEEL LETTERS AND FIGURES

The faces of CADILLAC Steel Letters and Figures combine a high degree of hardness with toughness, insuring exceptionally long life. Each stamp is clearly marked with character designation and size. Long tapering bevels assure easy alignment of characters. *(To the right, note CADILLAC's sturdily boxed Interchangeable Steel Type Set.)*



FORGING HAND STAMP



DIE INSERTS



EMBOSSING DIE

For Perfect Product Identificatio

There Are CADILLAC MARKING DEVIC Designed For ALL Marking Nee

Just as "variety" is called "the spice of life", varieties of marking methods and devices essential for meeting modern production demands. CADILLAC STAMP COMPANY is equip to offer or build every conceivable type of marking device, from simple hand stamps to especially created and designed machinery for unusual marking requirements.



CADILLAC 115 HAND MARKING MACHINE

For general purposes this floor type machine gives top service. Marking is done in a rolling operation—requiring minimum pressure. Marks flat or round parts of varying thickness. Foot pedal for marking flat or irregular contoured parts; table screw adjustable for round parts.



CADILLAC 52 AIR IMPACT PRESS

For high speed marking, assembling, branding, staking, crimping, riveting, also for producing light stampings. The 52 effects great savings in production — delivers speeds up to 10,000 strokes per hour—pressure up to 8 tons. Safe to operate, automatic controls. Can be hand, foot or electrically actuated.

Machines Above, Write for Bulletin M-120
Misc. Items, Write for Bulletin SE-130.



CADILLAC 45 HYDRAU MARKING MACHINE

Here's a compact, self-contained, fold mounted, hydraulic unit. Con trol gives full range of marking It will mark round, flat and in surfaces. Machine capacity is up t one inch impressions per minute.



HAND STAMP NUMERALS



INTERCHANGEABLE TYPE AND TYPE HOLDER SET



HAND STAMP SYMBOLS

CADILLAC
Marking Devices

CADILLAC STAMP COMPANY

Factory and Offices

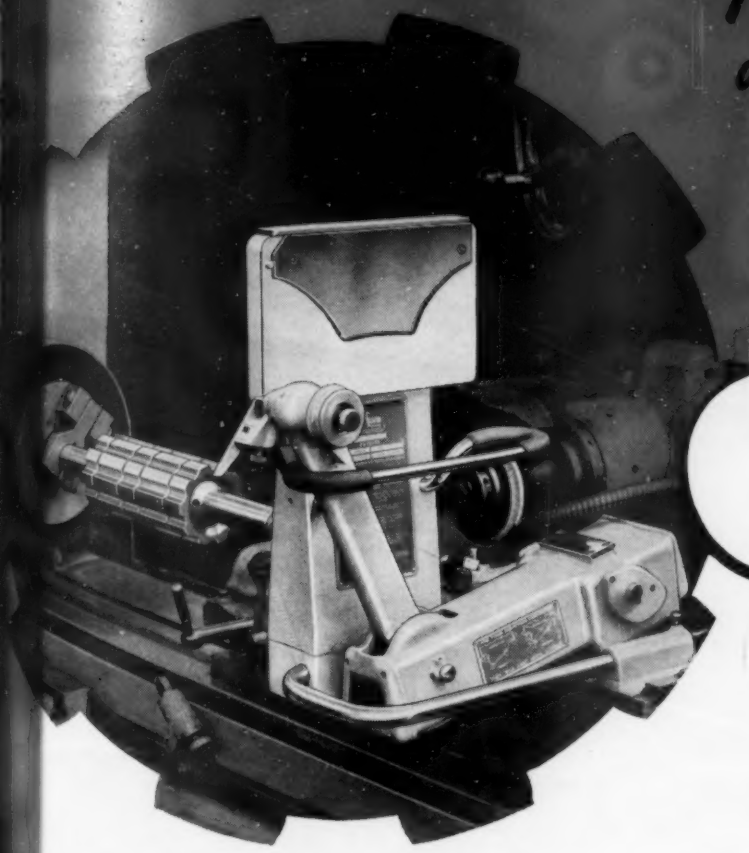
17313 Ryan Road • FO. 6-0500 • Detroit 12, Mich.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-22

NOW GRIND STRAIGHT and INVOLUTE SPLINES

Easily . . . Accurately

with



Diaform WHEEL FORMING ATTACHMENT

Applied to
CONVENTIONAL
SPLINE SHAFT
GRINDING MACHINES

The Pratt & Whitney DIAFORM Wheel Forming Attachment operates on the pantograph principle and provides a size reduction ratio of 10 to 1 between the template and the grinding wheel. This means a correspondingly favorable ratio in the reduction of errors in form grinding spline shafts, punches, dies, forming tools and other similar work pieces. Newly adapted to use with conventional spline shaft grinding machines, the DIAFORM now — for the first time — makes possible fast, easy, profitable production in accordance with American Standard, B5.15 on Involute Splines approved and published in 1950.

A lightweight, portable instrument, the DIAFORM does not interfere with normal grinding operations when left on the machine. Forming and re-truing wheels is accomplished by lightly traversing the tracer over an inexpensive template; even the most complicated forms are easily completed in a much shorter time than by any other method. Like all Pratt & Whitney products, the DIAFORM is manufactured and inspected to conform with rigidly high standards of quality and accuracy.

SEND NOW FOR COMPLETE INFORMATION

Learn how DIAFORMING can bring new standards of accuracy . . . and new savings . . . to your grinding operations. Just fill in and mail the attached coupon or write on your Company letterhead.

DO IT NOW



PRATT & WHITNEY

DIVISION NILES-BEMENT-POND COMPANY
WEST HARTFORD 1, CONNECTICUT, U.S.A.
BRANCHES IN PRINCIPAL CITIES

First Choice for Accuracy

MACHINE TOOLS • CUTTING TOOLS • GAGES

PRATT & WHITNEY — Div. Niles-Bement-Pond Co.
16 Charter Oak Blvd., West Hartford 1, Conn.

Gentlemen: Please mail my copy of:

- ☐ BULLETIN NO. 543 for WHEELS UP TO 1" WIDTH — 10" DIAMETER
- ☐ BULLETIN NO. 548 for WHEELS UP TO 3" WIDTH — 20" DIAMETER

NAME _____

POSITION _____

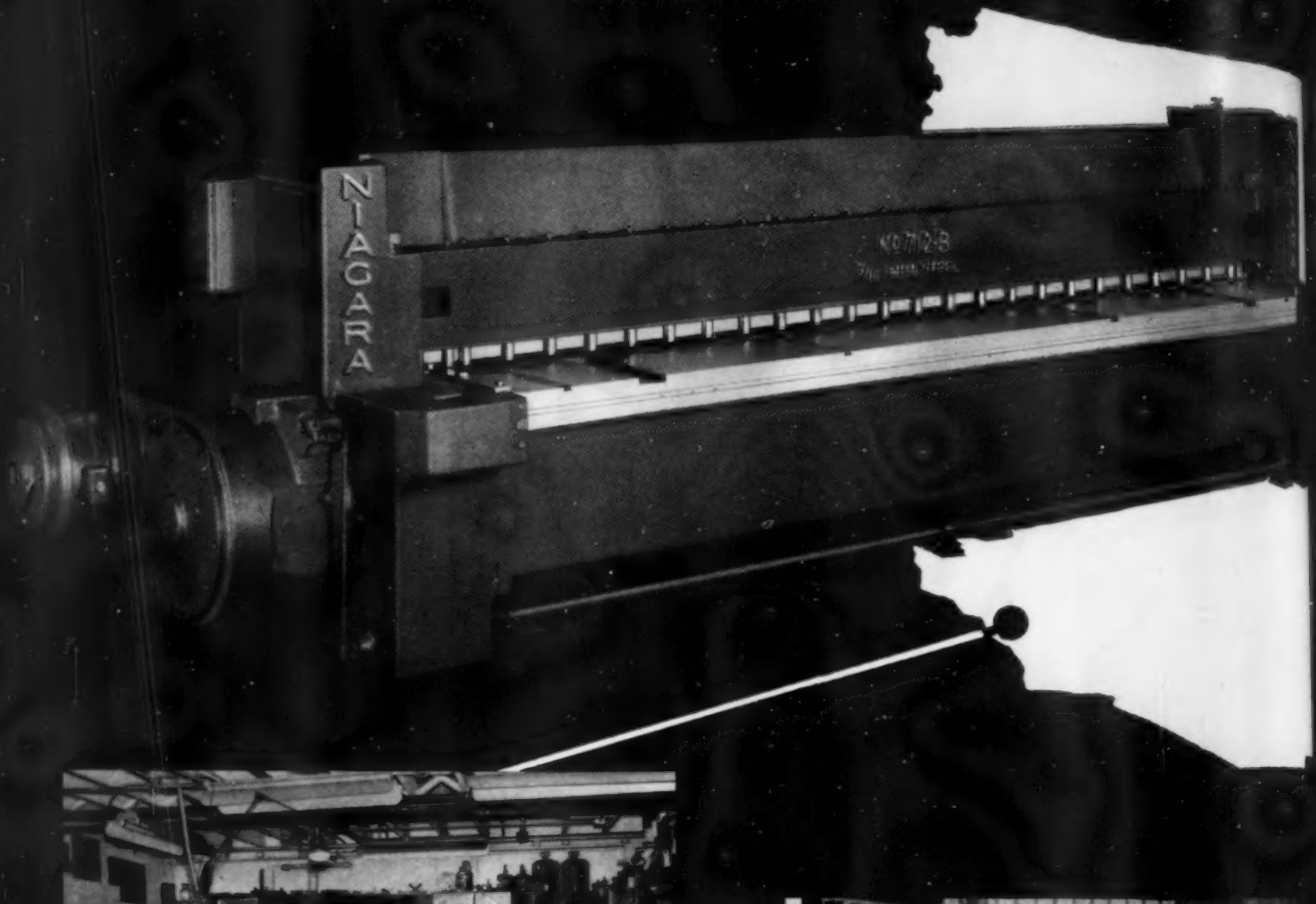
COMPANY _____

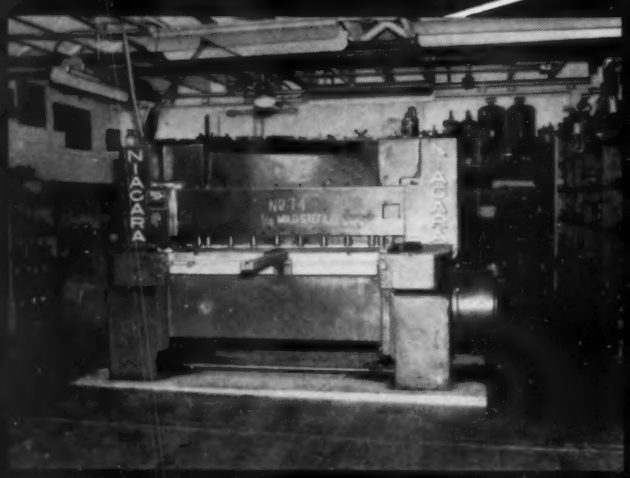
CO. ADDRESS _____

CITY _____ ZONE ____ STATE _____

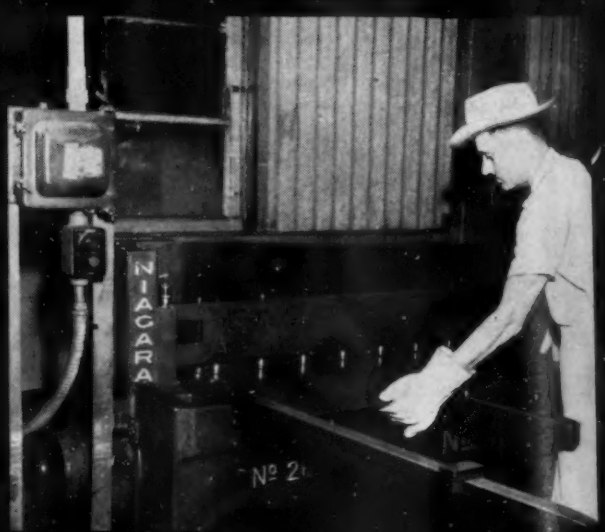
NIAGARA S

SERVE INDUSTRY FROM C





ELECTRONICS. Cutting .003" molybdenum to within .001" and ¼" copper with no change in set-up at a plant in California



DRUMS. Shearing sheets for drum bodies in Texa

NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N.

SHEARS

M COAST TO COAST



✱ For high volume shearing applications, Niagara shears are preferred because of their:

DEPENDABILITY
ACCURACY
LOW MAINTENANCE COST

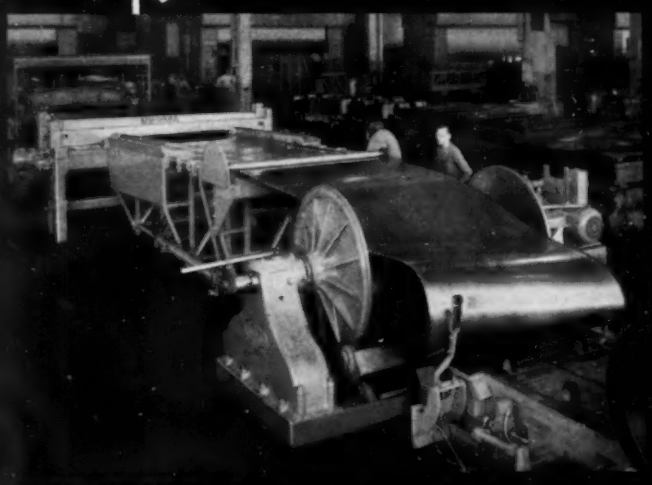
A few typical installations are illustrated

Niagara builds more than 80 different sizes and capacities of squaring shears . . . one to suit every requirement of production, maintenance or warehousing.

ELEVATORS. Two of seven Niagara Shears in production at a large plant in New Jersey



WAREHOUSE. Shearing thousands of tons of all kinds of steel at a steel warehouse in Michigan



AUTOMOBILES. Continuous operation in a cut off line at a body plant in Western New York

America's Most Complete Line of Presses, Shears, Machines and Tools for Sheet Metal Work

DISTRICT OFFICES: DETROIT • CLEVELAND • NEW YORK • PHILADELPHIA

Dealers in principal U. S. cities and major foreign countries

50 lbs. oil pressure

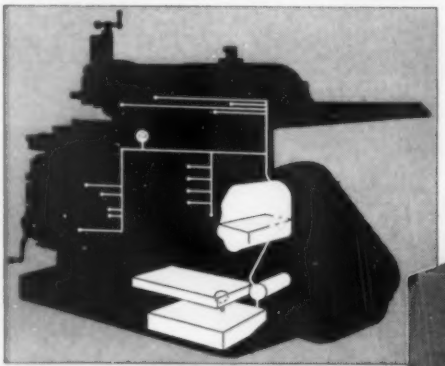
IS NECESSARY WITH A CUT LIKE THIS...



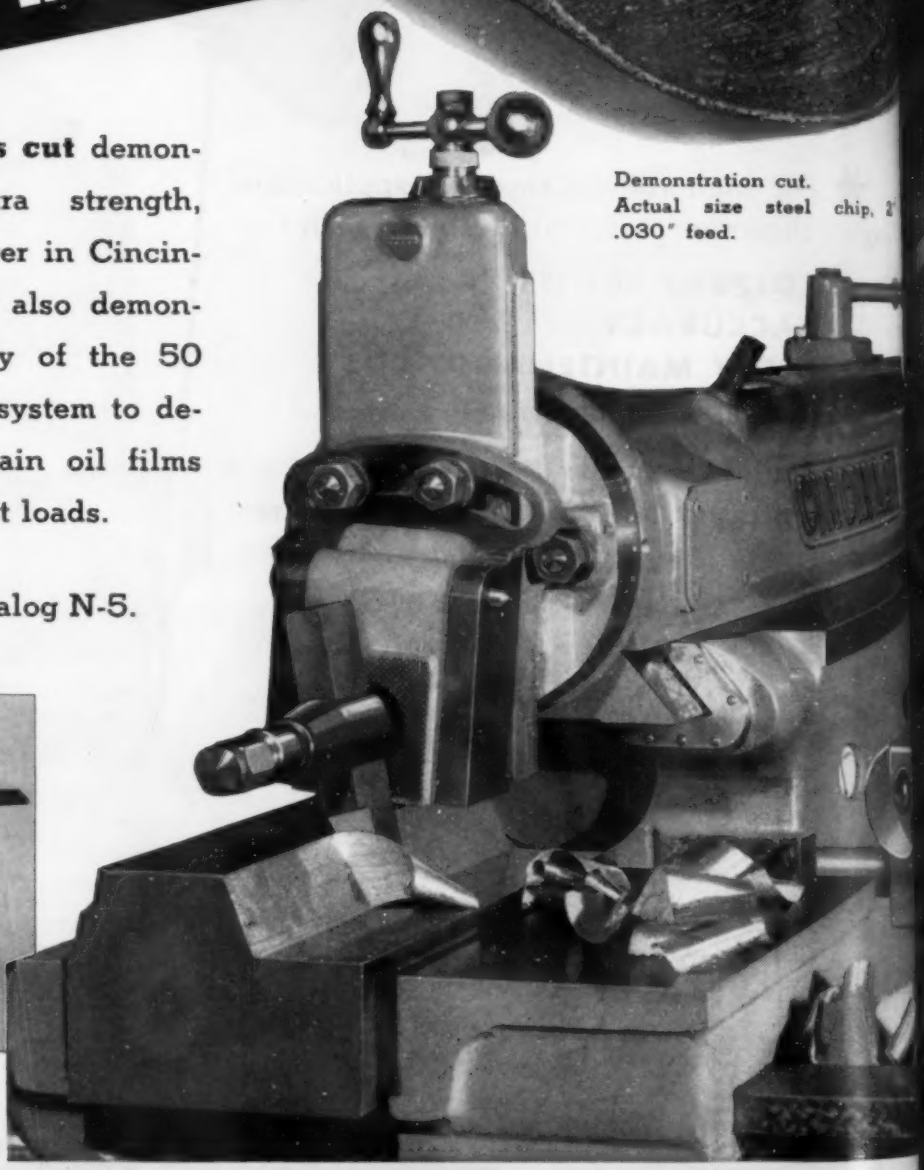
Demonstration cut. Actual size steel chip, 2" .030" feed.

This tremendous cut demonstrates the extra strength, rigidity, and power in Cincinnati Shapers. It also demonstrates the ability of the 50 p.s.i. lubrication system to develop and maintain oil films under the heaviest loads.

Write for Catalog N-5.



50 p.s.i. system includes 50 micro filter, settling basin and reservoir. Transmission runs submerged in oil.



CINCINNATI

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

"STANDARD for tough jobs since 1881"





Red Shield says:

Call your Industrial Supply Distributor for Shield Brand Reamers.

Specialized factory service available everywhere.

STANDARD TOOL CO.

STANDARD TOOL CO.

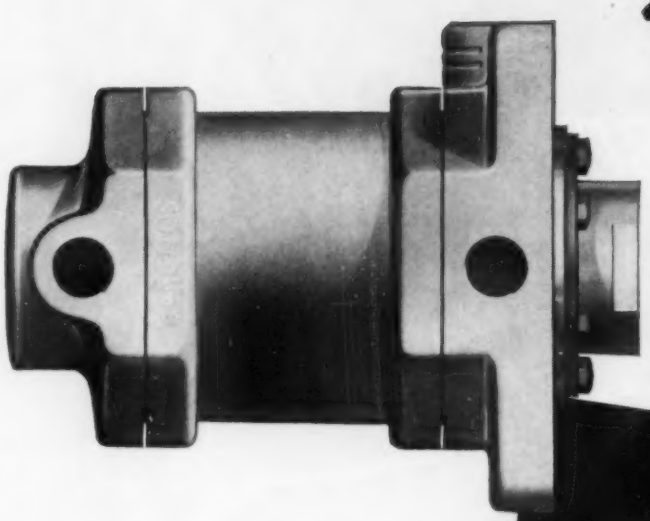
3950 CHESTER AVENUE CLEVELAND 14, OHIO

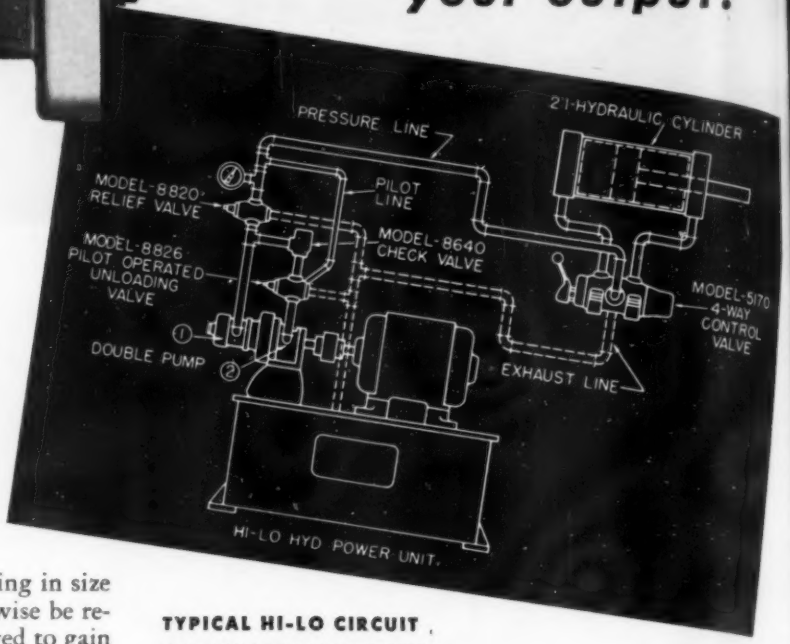
FACTORY BRANCHES IN: NEW YORK • DETROIT • CHICAGO • DALLAS • SAN FRANCISCO

THE STANDARD LINE: *Twist Drills · Reamers · Taps · Dies · Milling Cutters · End Mills · Hobs · Counterbores · Special Tools*

Double the Rod Size—

and increase your output!





TYPICAL HI-LO CIRCUIT FOR HYDRAULIC PRESSES

RIVETT 1500 P.S.I. HYDRAULIC 2:1 CYLINDERS have a piston rod about twice as large as standard cylinder rod size. The larger rod reduces oil displacement, permitting it to retract at twice the speed that it extends. This speed-up shortens cycle time, allowing the rod to extend again quickly, thereby accomplishing more work!

This faster speed is gained with a saving in size of motor and pump which would otherwise be required. 2:1 cylinders may also be employed to gain identical retracting and extending speeds, as well as to support larger loads where straight linear motion is used.

Available in 6 standard mountings: Foot, Trunnion, Center Line, Blind End Flange, Rod End Flange, and Clevis; in 10 bore diameters; in any stroke up to 96"; and with cushioning.

Remember—Rivett Hydraulic Cylinders have Keeper ring design, permitting the cylinder to be rotated to convenient pipe connection.

This circuit illustrates a press application where rapid speed and low pressures are required for the major portion of the stroke and high pressures are required for the "squeeze" portion of the stroke. The output of both the low pressure high volume pump (2) and the high pressure small volume pump (1) is directed to the hydraulic cylinder at a low operating pressure. When sufficient work load builds up, pressure in the system increases and the model 8826 pilot operated unloading valve unloads the output of pump (2) while the output of pump (1) is still directed to the cylinder. Direction of piston travel is controlled by model 5170 4-Way control valve. The horsepower requirement for this type of circuit is much less than if a single pump of sufficient volume and pressure for the application were used.

Send for Catalog Section No. 106 illustrating and describing all types and sizes of Rivett Hydraulic Cylinders.



RIVETT LATHE & GRINDER Inc.
DEPT. TE 10 • BRIGHTON 35, BOSTON, MASS.

WHEN YOU APPLY HYDRAULIC OR AIR POWER *Plan with* **RIVETT**

AIR AND HYDRAULIC VALVES AND CYLINDERS, HYDRAULIC POWER UNITS

FOR MORE PRODUCTION

Production Pointers from GISHOLT

GISHOLT

TIME-SAVING IDEAS

Presented as a service to production men, we hope some of these interesting ideas, chosen from thousands of jobs, will suggest ways to help you cut time and costs in your own work.

HIGH PRODUCTION SETUP FOR THIN-WALL PARTS

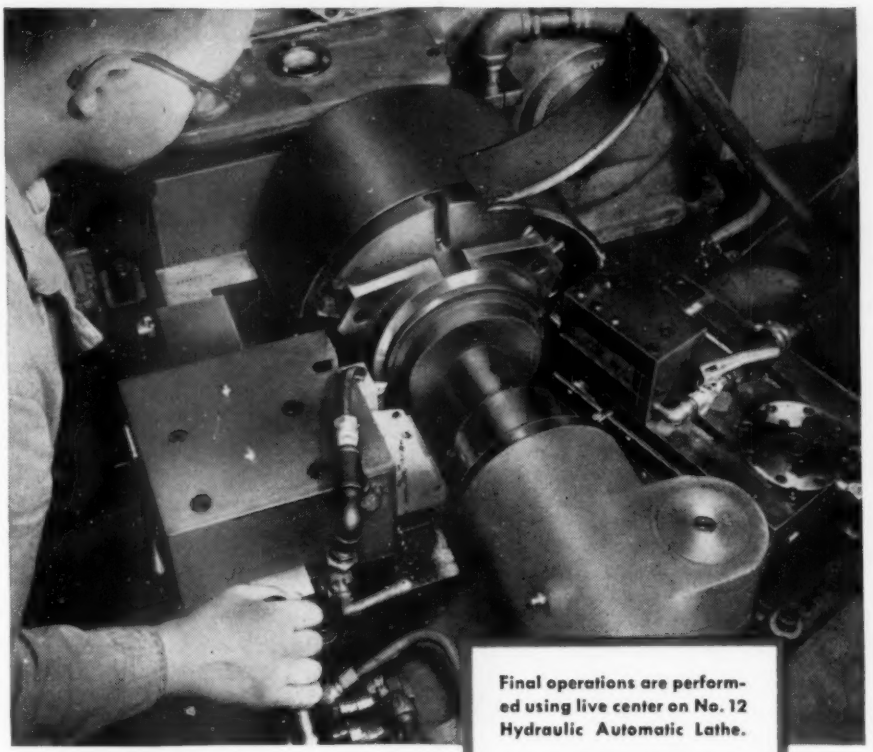
1 Man Tends 3 No. 12 Hydraulic Lathes on Fast, Precision Work

How to get the needed high production on tricky thin-wall parts requiring a large number of operations?

This manufacturer found the most practical solution was dividing the work among three No. 12 Hydraulic Automatic Lathes. By this method only one man is required to operate all three machines, turning out a completed part every 1.3 minutes . . . keeping costs at rock bottom.

Each No. 12 Hydraulic Lathe has the same type 12" three-jaw air chuck for holding the stainless steel ring flange. Compensating serrated jaws, grip the workpiece with support for over three-quarters of the circumference. This eliminates danger of springing the part with total pressure.

Here's fast, precision machining of delicate parts involving 13 operations on 3 No. 12 Hydraulic Lathes—with one operator.



Final operations are performed using live center on No. 12 Hydraulic Automatic Lathe.

Operations are divided up this way:

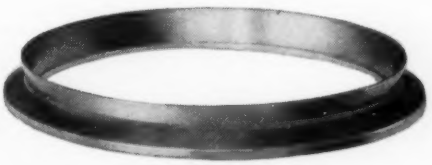
1st—*Part is held on the O.D. Turn, face, bore, counterbore and chamfer. This single operation completes the thick base section shown here.*



2nd—*Part is held on previously machined O.D. Rough turn O.D. Rough and finish turn the tapered I.D., face and chamfer. Part now looks like this.*



3rd—*Part is held on same surface and supported with a live center. Finish form the O.D., face and chamfer; part is then completed.*



Ask for bulletin showing the No. 12 Hydraulic Automatic Lathe doing 28 widely different jobs which illustrate its unusual flexibility.

FRO[illegible]AN-[illegible]DURS AND MACHINES

GISHOLT

GISHOLT

TIME-SAVING IDEAS

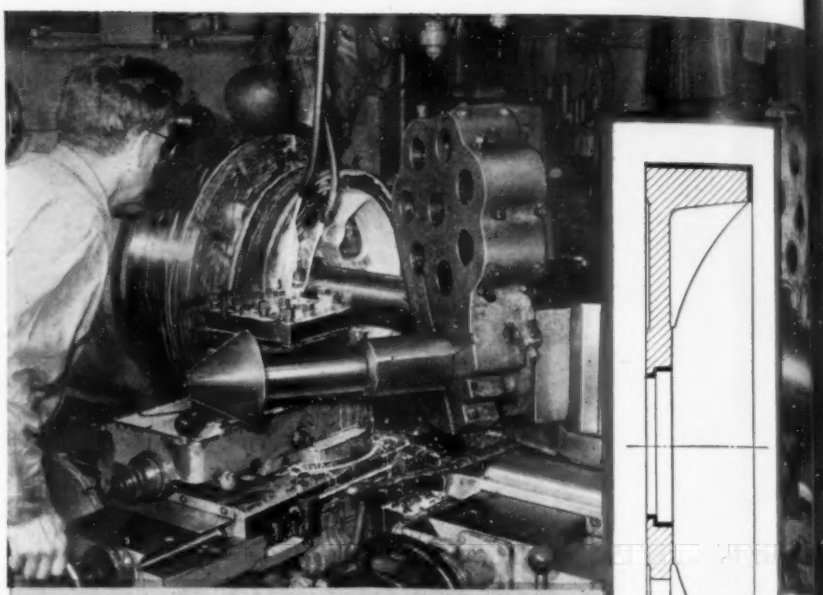
New Saddle Type Lathe Permits Multiple Cutting at Higher Speeds

Perhaps you, too, can take advantage of sheer power and rigidity in a turret lathe to cut your costs. Hyster Company of Portland, large manufacturer of handling equipment, formerly machined these heavy drum gears on a pre-war machine. Production of the 22", 260 Brinell parts averaged an hour for the first operation.

When they put the job on a new Gisholt 4L Saddle Type Turret Lathe, floor to floor time was cut in half—with parts completed in 30 minutes. Simultaneous machining from both turrets, plus faster operating speeds—and the ability to take heavier cuts, account for the increased production.

A 28" three-jaw chuck holds the part in the cored holes in the web. Rough and finish boring, counterboring and facing operations are handled from the cross-feeding hexagon turret. At the same time, tools on the square turret face and turn the O.D. Production is in lots of 100.

HOW HYSTER COMPANY CUT COST IN HALF ON HEFTY PARTS



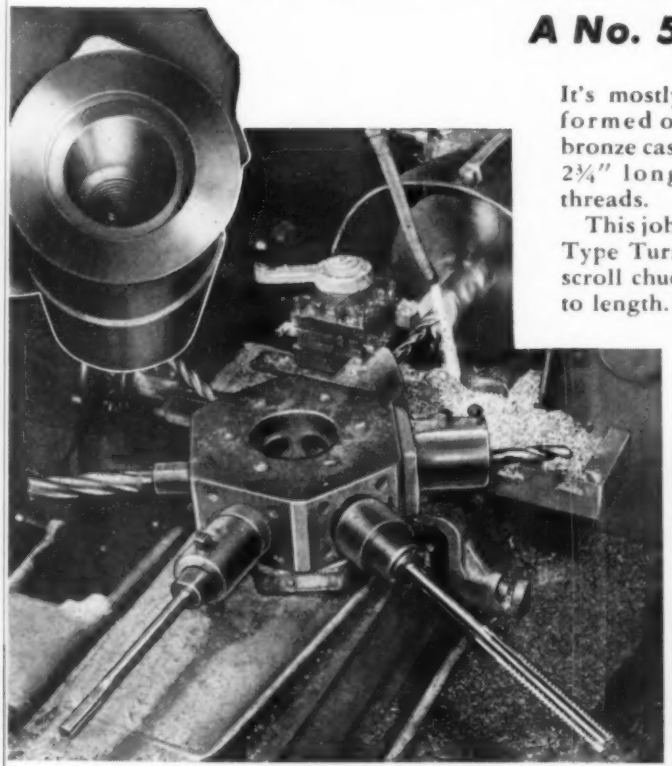
Operator Ed Davis keeps production going at top speed.

Heavy lines show machined surfaces.

An excellent example of how Gisholt power and rigidity permit multiple tooling and heavier cuts at higher speeds to save time and costs.

FINE SETUP FOR FAST MACHINING OF BRONZE NUTS

A No. 5 Ram Type Turret Lathe Job

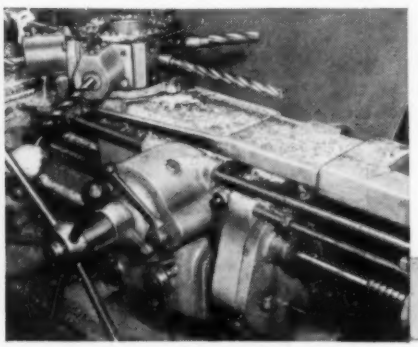


Turret Lathe setup for bronze nuts.

It's mostly inside work to be performed on these hard aluminum bronze castings calling for a ⅞" hole 2¼" long with four t.p.i. Acme threads.

This job is set up on a Gisholt Ram Type Turret Lathe with a three-jaw scroll chuck. The square turret faces to length. Next, three successive stations on the hexagon turret start drill, drill through and bore. At the same time, the O.D. is turned from the square turret.

The counterbore is then made and the hole is reamed full depth from the hexagon turret. The end is then formed from the square turret. Finally, the rough, semi-finish and finish taps are used with the threading attachment on the hexagon turret.



Engaging the threading attachment.

This well planned tooling plus instantaneous speed change with the Hi-Lo trip lever, keeps production moving fast.

GISHOLT

HOW TO MULTIPLY OIL SEAL LIFE 8 TIMES

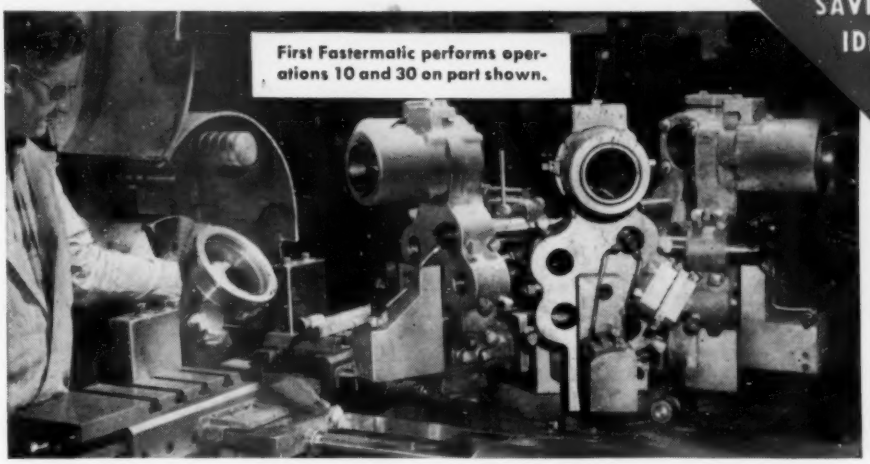
GISHOLT TIME-SAVING IDEAS

DOUBLE TOOLING FOR 4 OPERATIONS ON 2 MACHINES

Easy Changeover on Fastermatics Simplify Job

question here was how to per- four separate machining opera- s on these steel bearings with a imum of equipment . . . and with operator, if possible.

ouble tooling of a pair of Faster- ic Automatic Turret Lathes pro- d the answer. Here's how: Oper- ns 10 and 30 are handled on the machine, operations 20 and 40 he other. A single operator, be- se of the Fastermatics' automatic es, is able to tend both machines. ith both sides roughed after op- ions 10 and 20, he makes easy ngeover of the two machines for rations 30 and 40. Double tooling both machines means simply a nge of chuck jaws and some small l holders.



First Fastermatic performs operations 10 and 30 on part shown.

As shown here, in operation 10, seven different surfaces are rough machined by tools mounted in the turret and both cross slides. Unused turret stations are by-passed. Nine surfaces are finish machined in operation 30—those already roughed out plus an additional counterbore and a necking operation. The other machine operates essentially the same.

With careful planning, 2 Fastermatics do double duty with minimum changeover.

SHOWING HOW "SPECIAL" MACHINING PROBLEMS CAN HAVE SIMPLE SOLUTIONS

...especially with the Simplimatic

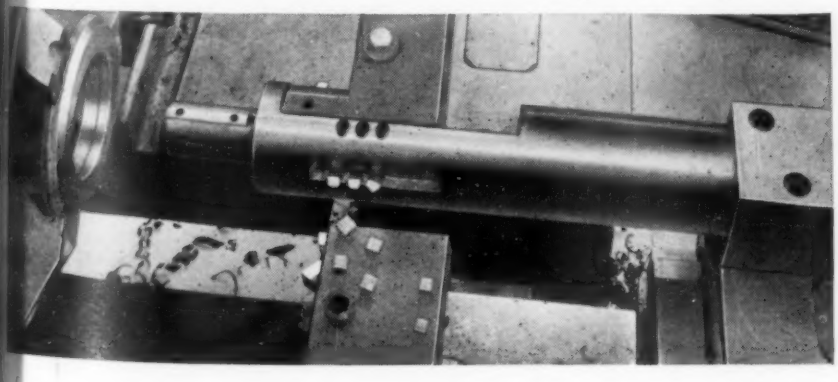
Before machining this steel bevel drive gear, this producer had to get answers to:

1. **How to bore, face and counterbore in 1st operation . . . made more difficult because the counterbore is on the chuck side of the piece.**
2. **How to get two tool slides within the 4" I.D. for simultaneous boring and counterboring.**
3. **How to spare the expense of a special machine and elaborate tooling . . . and yet have rapid changeover to the 2nd operation.**

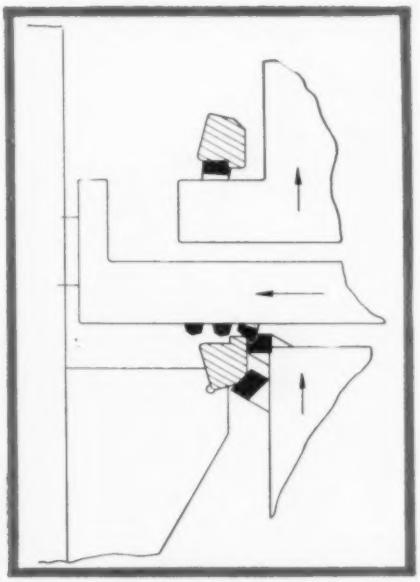
The ready answer to all three questions was the standard Simplimatic Automatic Lathe equipped with special tool blocks on standard slides.

The front slide feeds across the part to face and break the corner. The tool on the rear slide, which backfaces and forms the counterbore, is carried on a holder recessed into the oversize boring bar, thus providing room for getting into work. This boring bar, carried on the center slide which roughs, finishes and chamfers the bore, is supported by the pilot in the spindle (see layout).

Time is only 1.5 minutes, f. t. f.



The standard Simplimatic, with its infinite possibilities of slide and tool arrangements, avoids the need for a special and costly machine.



Note how special tool block in rear slide starts from cutaway in oversize boring bar.

GISHOLT

TIME-SAVING IDEAS

HOW TO MULTIPLY OIL SEAL LIFE 8 TIME

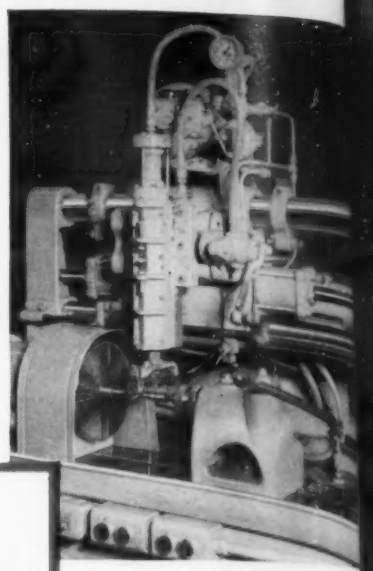
Woodward Governor Company Keeps Seals Oil-Tight Longer by Superfinishing

If oil seals in these diesel engine governors lose their oil-tightness, it means serious trouble: (1) Because the power piston operates in a vertical position, reciprocating action could cause loss of sump oil. Also, (2) any leakage at the main drive seal might result in engine oil contaminating governor oil and impairing its operation.

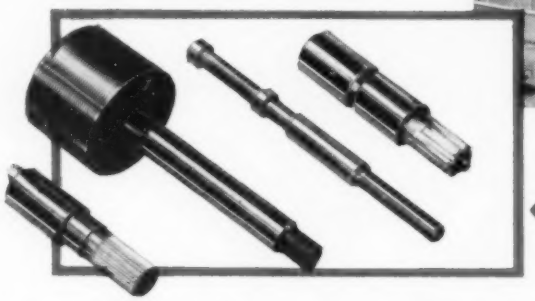
How to make the seals oil tight, and keep them that way longer? The solution was simple: by Superfinishing. It's shown in action here, at **Woodward Governor Company,** Rockford, Illinois.

The parts come to the Model 51-A General Purpose Superfinisher with a ground finish of 10 micro inches. After Superfinishing, they have a surface smoothness of 3 micro inches. Production is at the rate of 40 pieces per hour—with inspection for size and finish made by the operator, while the machine goes through its automatic cycle.

Here, at negligible cost, Superfinish assures oil-tight seals and at least 8 times longer seal life by removing all amorphous "smear metal."

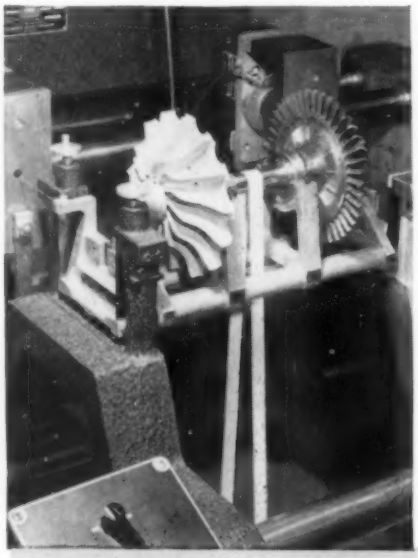


Close-up shows Superfinisher doing pilot valve of engine governor.



Superfinished components of governor: drive shaft, power piston, pilot valve, rotating bushing.

HIGH-FLYING PARTS BALANCED TO .020 OUNCE INCHES



Note how the impeller is balanced while running in its own ball bearings.

Direct Reading Shows Stock to Be Removed for Correction

Supercharger impellers for high-altitude aircraft call for dependable accuracy of balance.

Doing the job of assuring smooth, dependable operation is a Gisholt Type 3S DYNETRIC Balancer. The workpiece is rotated with its own ball bearings, thus duplicating normal operating conditions. Unbalance is read directly in terms of stock to be removed. This avoids errors in translating ounce inches into actual correction to be made. Stock is removed from the scallop on one end and the rotor on the other.

In a matter of seconds the entire operation—locating, measuring and correcting—is completed, and the part is balanced to an accuracy of .020 ounce inches. Gisholt Balancers are easy to set up and can be operated by average shop personnel.

To insure lasting, vibrationless operation, balancing of impellers is made a regular part of production—with a speed and accuracy not possible on any other equipment.

Textbook on balancing, **yours for the asking. Has all the facts, helpful information. Write for "Static and Dynamic Balancing."**

DYNETRIC BALANCERS GISHOLT

DEVELOPED JOINTLY WITH WESTINGHOUSE ELECTRIC CORPORATION "DYNETRIC" IS A TRADE MARK REG. U. S. PAT. OFFICE BY WESTINGHOUSE ELECTRIC CORPORATION

Complete Balancing School

Students from more than 100 companies have already completed courses in the Gisholt Balancing School—the only training of its kind available today. Write for details, starting dates.

No. 9-1053
580

GISHOLT

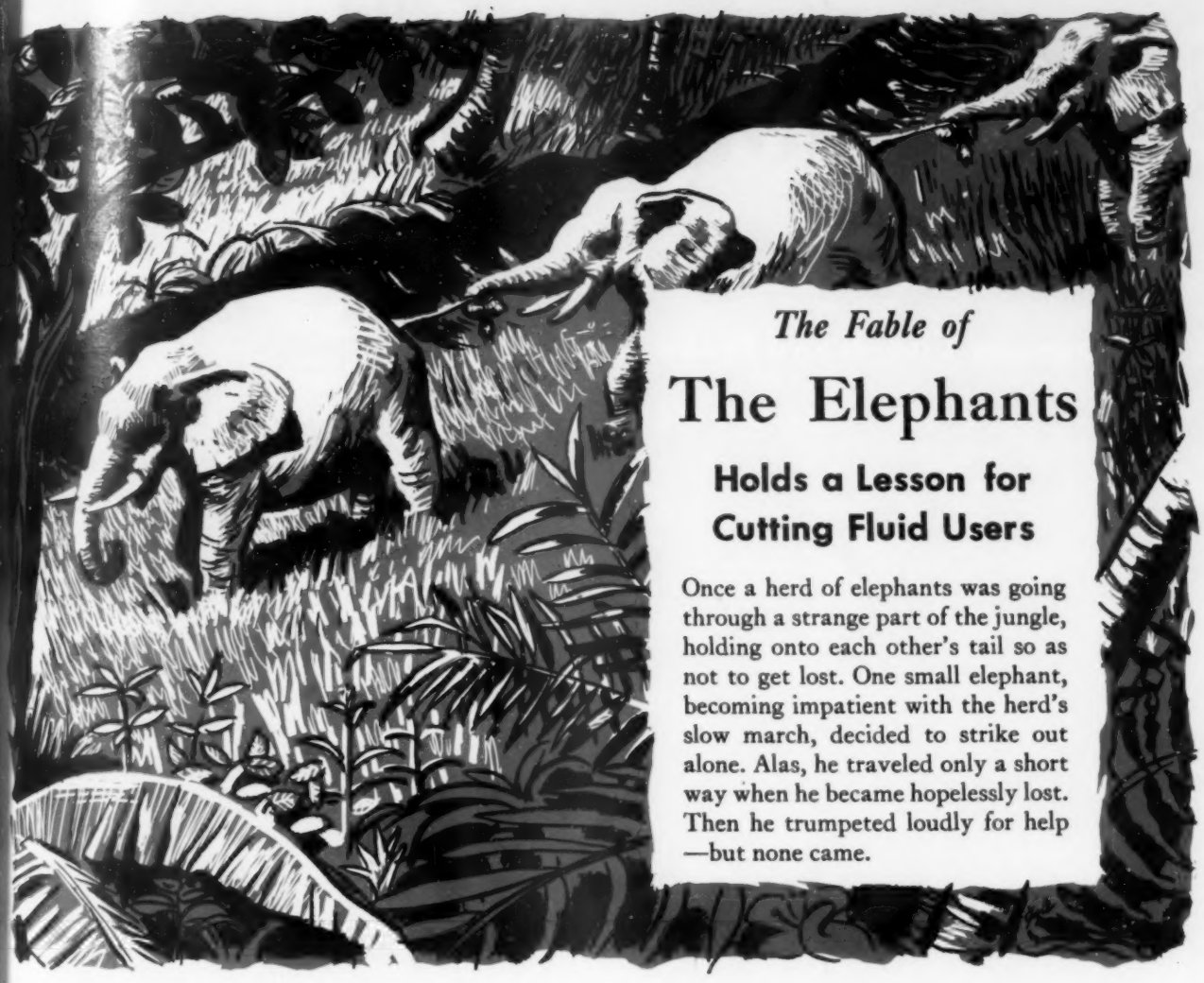


THE GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

Write for your copy of Gisholt's new general catalog.

GISHOLT MACHINE COMPANY Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES



The Fable of

The Elephants

Holds a Lesson for Cutting Fluid Users

Once a herd of elephants was going through a strange part of the jungle, holding onto each other's tail so as not to get lost. One small elephant, becoming impatient with the herd's slow march, decided to strike out alone. Alas, he traveled only a short way when he became hopelessly lost. Then he trumpeted loudly for help —but none came.

The Lesson:

Like the little elephant in the fable, it is easy to get lost in the cutting fluid jungle. You need something to follow if you are to stay out of trouble. Realizing this, Stuart Oil has devised a unique Selector to serve as a guidepost to point out the path to the right cutting fluid. The Selector recommends cutting and grinding fluids which field experience has shown to be most suitable under average job conditions. Machinability ratings are listed, and complete instructions are given. Included are rules of thumb to follow when short tool life and poor surface finish are encountered.

To make going astray even more difficult, Stuart has developed the Dilut-O-Graph which tells how much cutting oil is required for a certain dilution when blending is done in tanks of different capacities. The Dilut-O-Graph ends costly guess-work.

Your Stuart Oil Representative will gladly give you a Selector and Dilut-O-Graph. And while he is in your plant, ask him to show you how Stuart cutting and grinding fluids will improve your machining results.

FREE CUTTING FLUID SELECTOR AND DILUT-O-GRAPH



In this folder is Stuart's Cutting Fluid Selector and Dilut-O-Graph. They are double-barreled protection against mistakes in selecting and preparing cutting fluids. Instructions are included. Fill out and mail coupon.

More Than a "Coolant" is Needed

D. A. Stuart Oil Co.
EST. 1865 LIMITED

TIME-TESTED CUTTING FLUIDS AND LUBRICANTS

2727-49 S. Troy St., Chicago 23, Ill.

In Canada: R. W. Horsey Canada, Ltd.
Subs. D. A. Stuart Oil Co., Ltd.
3575 Danforth Ave., Toronto

CLIP TO YOUR COMPANY LETTERHEAD AND MAIL
D. A. Stuart Oil Co., Ltd., 2727-49 S. Troy St. Chicago 23, Ill.

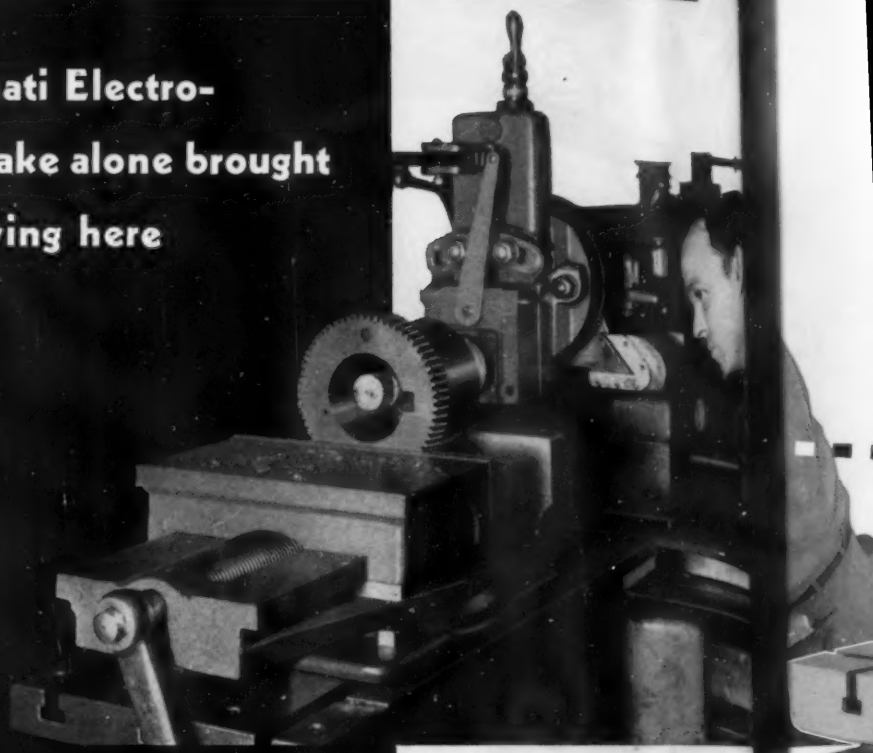
☐ Have Stuart Representative Call
☐ Send Cutting Fluid Selector & Dilut-O-Graph Folder

Your Name .....

Title .....

Outstanding Time Saver...

The New Cincinnati Electro-Magnetic Clutch and Brake alone brought a 30% time-saving here



The New Cincinnati Magnetic Clutch and Brake, with its single, convenient control lever, gives the operator the fastest, simplest and most accurate control of his Shaper and converts waste time into productive time.

This powerful clutch and brake requires no adjustment, and has a long, maintenance-free life.

Write for Cincinnati Shaper Catalog N-5.

Shaping time on 7 internal oil grooves in these steel sleeves was reduced from 12.5 minutes to 8 minutes, by the Cincinnati Electro-Magnetic Clutch and Brake.

CINCINNATI

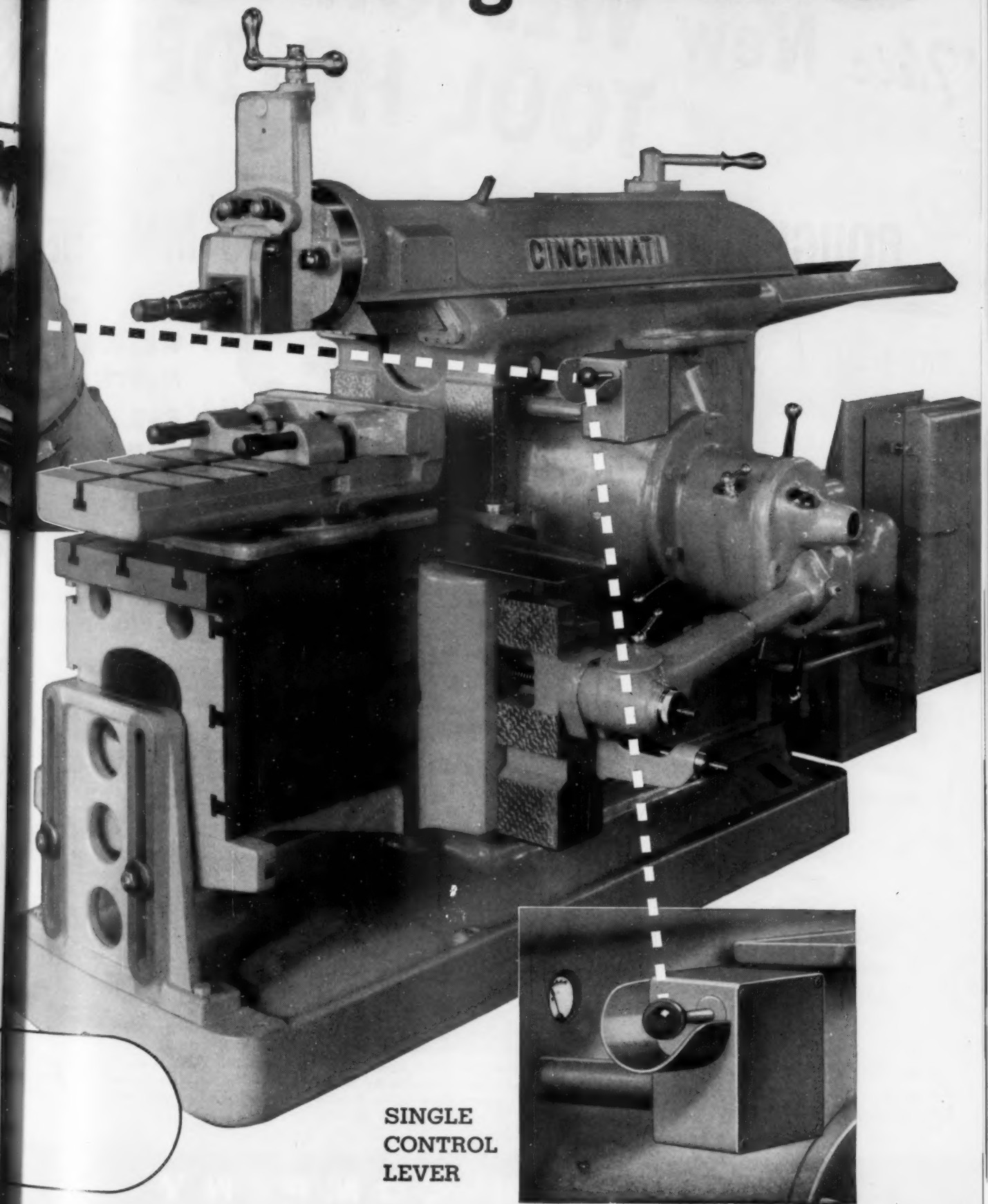
THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

Combine WESSON TOOL ENGINEERING SKILL and EXPE

Our 20th year

...Outstanding ACCURACY



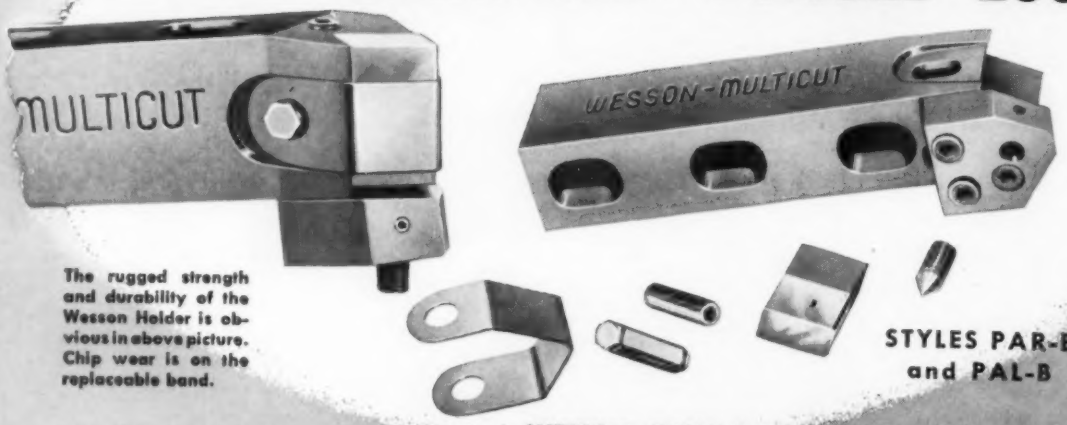
SINGLE
CONTROL
LEVER

Combine WESSON TOOL ENGINEERING SKILL and EXPE

Our 30th Year In Carbide!

This New WESSON Engineer TOOL HOLDER

ROUGH TURNS HOT FORGED 155 MM SHE



The rugged strength and durability of the Wesson Holder is obvious in above picture. Chip wear is on the replaceable band.

STYLES PAR-B and PAL-B

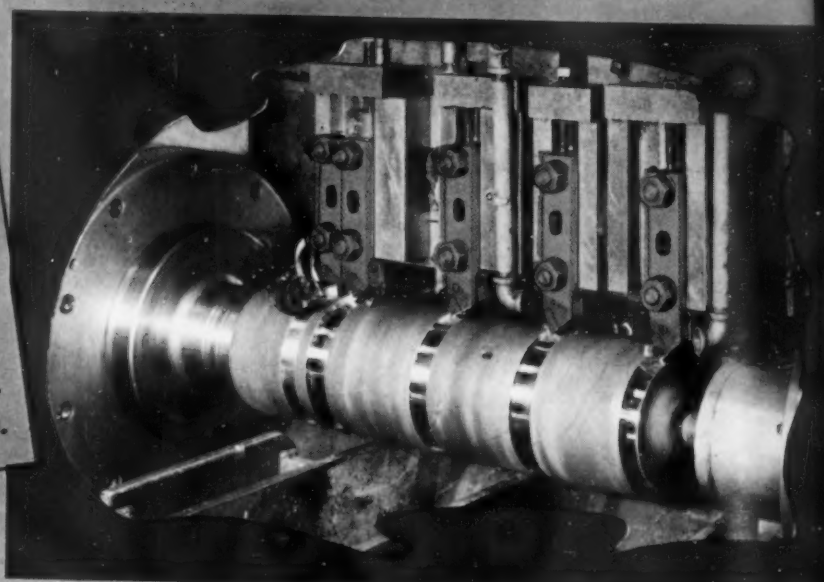
WESSON MULTICUT PARALLELO BAND TYPE HOLDER

WESSON BAND TYPE HOLDERS ARE VIRTUALLY INDESTRUCTIBLE UNDER ABNORMAL CONDITIONS. THE STEEL BAND IS REPLACEABLE AT LOW COST. 101 DIFFERENT STANDARD STYLES AND SIZES ARE AVAIL

ACTUAL JOB SETUP NOW AT A LARGE SHELL MANUFACTURING CO.

Part.....155 MM hot forged shell.
Operation.....Rough turning.
Machine..Burleigh Stocker Hydra-Feed automatic lathe.
Tools.....5 Wesson Multicut Band Type Parallelogram Tool Holders with Parallelogram Wesson-metal insert grade WM.
Depth of cut.....Up to 1" maximum.
Feed.....032 per revolution.
S.F.M.....320.

The Wesson Tool Engineer in your area has full details on this job. Ask him about Case History #135.



This photo, taken while the machine was running shows the depth of cut and type of finish obtained by rough turning with Wesson Holders and Wesson-metal insert. Note extra holder strength possible with the parallelogram insert. The lead angle is 25°.

WESSON COMPANY

1220 WOODWARD HEIGHTS BLVD. FERNDALE (DETROIT 20), MICH.

WESSONMETAL HIGH PERFORMANCE *for Increased Production . . .*

. . . And *This*

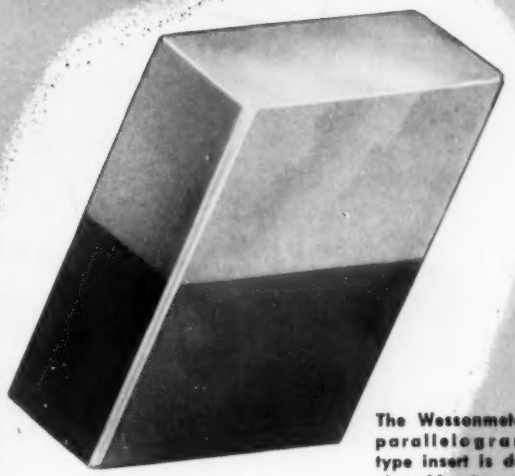
WESSONMETAL INSERT

TH CUTS UP TO 1" DEEP!

nother FIRST for WESSON

with Tool Costs Reduced by Over 60%
Production Increased 400%

OLD METHOD	NEW WESSON METHOD
Cost.....$37.50	Tool Cost.....$50.00
able Carbide.....3/8"	Useable Carbide.....5/16"
rage Pieces per Grind...60	Average Pieces per Grind...60
es Machined per Tool..420	Pieces Machined per Tool..1680
Cost per Piece.....8.1c	Tool Cost per Piece.....2.9c
wn Time for Tool Change... 15 min. every hour	Down Time for Tool Change... 4 min. every hour



The Wessonmetal parallelogram type insert is designed for strength and durability.

½" x 1" x 1½" either solid or with brazed steel slug on bottom for back up screw contact.

WESSONMETAL IS OUTSTANDING FOR HIGH PERFORMANCE BECAUSE IT IS UNIFORMLY DEPENDABLE IN QUALITY

WESSONMETAL is available in 8 grades for all types of metal working.



WESSONMETAL
CEMENTED CARBIDE

SEE THE DRAMATIC STORY OF CARBIDE *in Sound and Color*
"THIS CARBIDE AGE"
There's a Wesson Tool Engineer in your area who will give you full details about this fine educational movie. Call him or write.

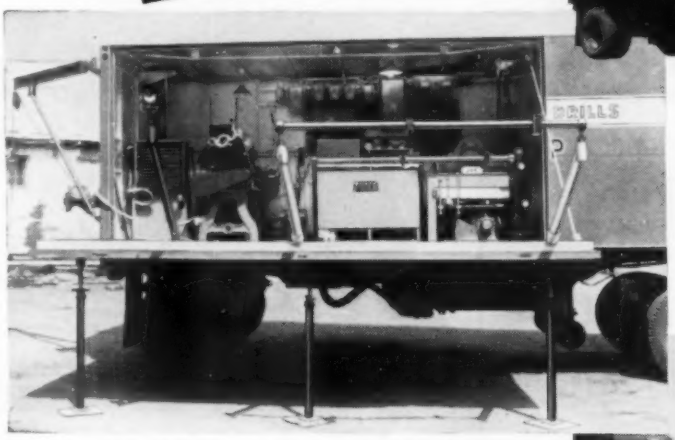
VESSON METAL CORPORATION

LEXINGTON 34, KENTUCKY

Announcing with "JOY"

Another TOCCO* First:





Induction Heating *on Wheels!*

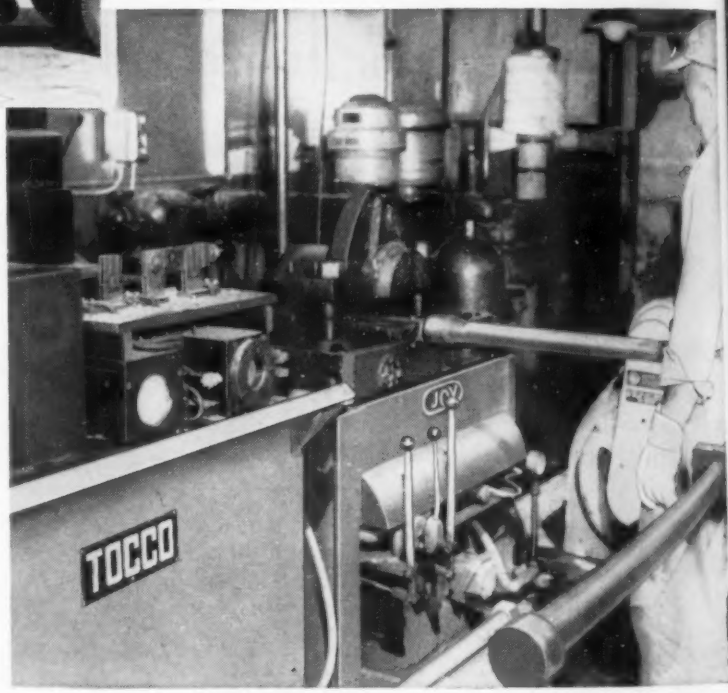
Joy Manufacturing Company's Mobile Shop for on-location reconditioning of mine drill steels.

BECAUSE of the size and length of mine drill steels, (some weigh as much as 320 lbs. and are 30 ft. long) much expense and lost time was involved in shipping them back to the factory for reconditioning. Realizing this problem, Joy Manufacturing Co., Pittsburgh, Pa., decided to send "Mohammed to the mountain" in the form of the *Joy Mobile Shop.*

The purpose of the Mobile Shop is to travel to designated territories in the United States, calling periodically on users of Joy's "Challenger" Drill. All broken drill steels are reconditioned on the spot—saving Joy's customers transportation costs and lost time.

The Joy Mobile Shop carries a 20 KW, 10000 cycle TOCCO Induction Heating machine, powered by a diesel-electric generator. The TOCCO unit heats the drill steels to 2200° F for upsetting, then reheats the upset ends to 1500° F for normalizing prior to machining.

This unusual application story is typical of the way TOCCO engineers team up with American Industry for better products and services, faster—and at lower cost.



Operator guiding drill steel in upsetter after heating end to 2200° F in TOCCO machine at left.

THE OHIO CRANKSHAFT COMPANY



TOCCO

*Trade Mark Reg. U. S. Pat. Off.

New Technical Film-

If you would like to see our new 30 minute color film—"The TOCCO Story" write on your company letterhead to The Ohio Crankshaft Co., Dept. W-10, Cleveland 1, Ohio.

Officers

Roger F. Waindle
Muskegon, Mich.
President

Joseph P. Crosby
Lexington, Mass.
First Vice-President

H. B. Osborn, Jr.
Cleveland, Ohio
Second Vice-President

Howard C. McMillen
Bedford, Ind.
Third Vice-President

Raymond C. W. Peterson
Toledo, Ohio
Secretary

Harold E. Collins
Houston, Texas
Treasurer

Wayne Ewing
Los Angeles, Calif.
Assistant Secretary-Treasurer

Harry E. Conrad
Detroit, Mich.
Executive Secretary

Allan Ray Putnam
Detroit, Mich.
Assistant Executive Secretary

Board of Directors

R. F. Waindle, Chairman
Muskegon, Mich.
L. B. Bellamy
Detroit, Mich.
T. J. Donovan, Jr.
Philadelphia, Pa.
W. G. Ehrhardt
St. Louis, Mo.
G. A. Goodwin
Dayton, Ohio
Ben J. Hazewinkel
South Gate, Calif.
W. B. McClellan
Detroit, Mich.
H. B. Osborn, Jr.
Cleveland, Ohio
G. A. Rogers
Montreal, Quebec
F. J. Schmitt
Chicago, Ill.

Editorial Committee

Joseph L. Petz, Chairman
Poughkeepsie, N. Y.
Lee M. Davis
Springfield, Vt.
Edward W. Dickett
Chicago, Ill.
David A. Schrom
York, Pa.
Gordon Swardenski
Peoria, Ill.
George P. Torrence
Rockford, Ill.

The Tool Engineer

Try It Out on the Dog

The backwoods method of trying new recipes on the family mongrel was hard on dogs but advanced the culinary art more rapidly than if all food ideas had had to wait for the dogs' masters to volunteer. This history of four-footed tasters provides an apt analogy to present-day methods in industry. No idea, no technique and no method can be accepted until it has been "tried out on the dog."

Individual tool engineers and the society to which they belong must both be willing to try new ideas. With the attempt to do things in new ways comes progress. From those willing to pioneer in the past, industry now bears fruit in the form of products that were not even dreamed of at the time the foundation ideas were being tried.

Pioneering is not enough. Once the step has been taken, it is important that the result of trying it on the dog be broadcast.. Is the dog healthy or is he dead? Is the method worthwhile and can it be applied in other ways? Herein lies one of the inherent functions of the American Society of Tool Engineers—your society.

The Society spreads information among tool engineers so that each can benefit from the experience of all. Through publications, THE TOOL ENGINEER, Annual Meetings, ASTE Industrial Expositions and through continuing committee activity, the Society makes available a common meeting ground among its members. As these audience-participation shows operate, an individual can draw more from the common fund than he puts in . . . unless we take it upon ourselves to add what we can.

Organization of the Society is a two-way street for information. Individuals can bring up any phase of tool engineering in Chapter meetings, and, because of duplicate committees on national and local levels, these Chapter topics can be collected and collated. Once a trend is apparent, all the Chapters can be informed. This induces an accelerated rate of progress.

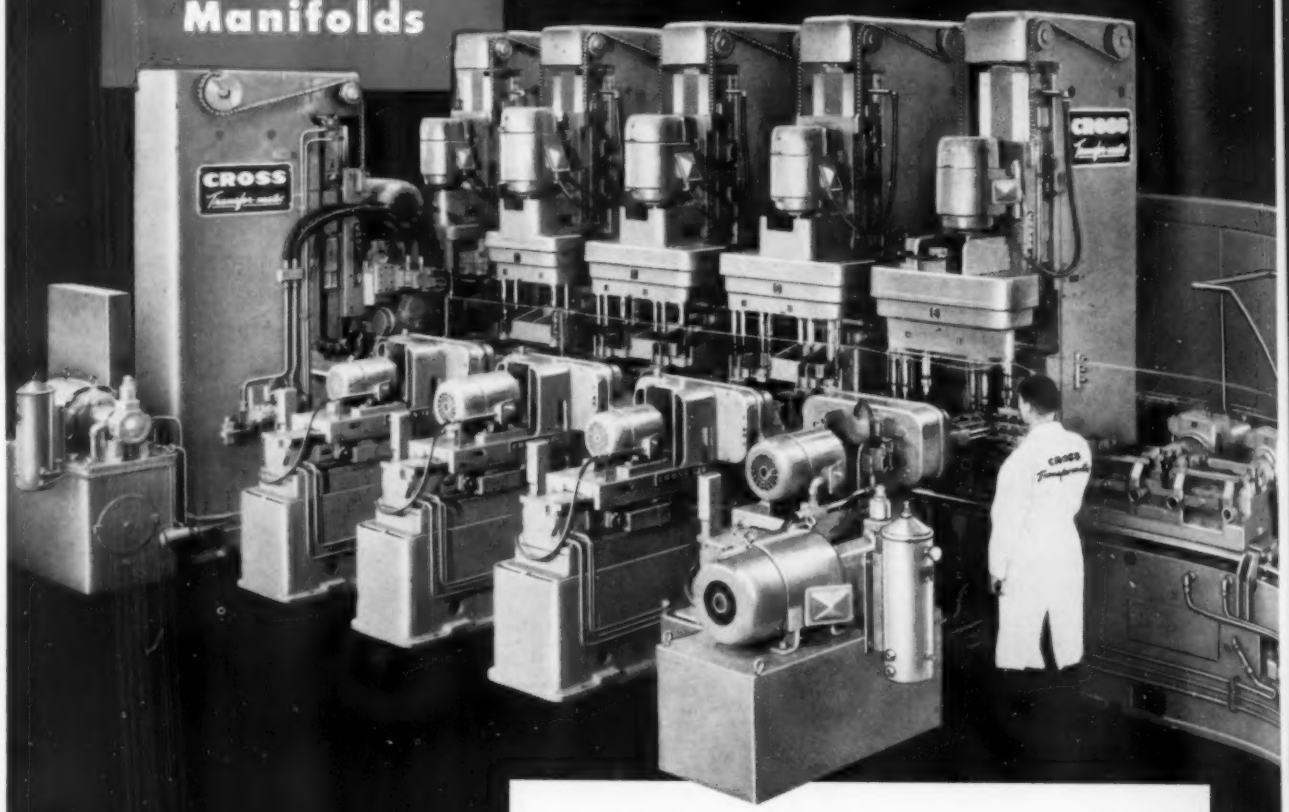
Let us measure our success as a society not by how many healthy dogs or dead dogs we have, but by how many of our members know why the dogs have ended as they have.

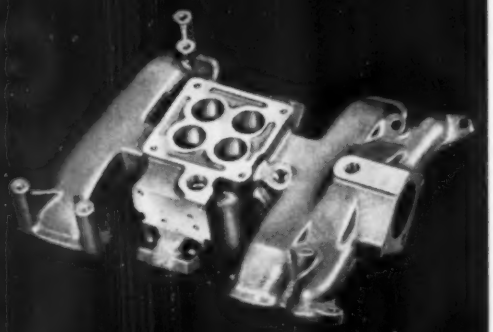
R. F. Waindle

PRESIDENT
1953-1954

Drills, Bores, Mills, Intake Manifolds

Another Transfer-matic by Cross





- ★ 218 parts per hour at 100% efficiency.
- ★ Seven stations including loading and unloading.
- ★ 54 operations—22 drilling, 8 chamfering, 2 reaming, 12 tapping, 8 boring and 2 milling.
- ★ Two parts machined at one time in each station.
- ★ Palletized work holding fixtures and automatic transfer from station to station.
- ★ Power wrenches for automatically operating work holding fixtures.
- ★ Other features: Pre-set tools, built-in chip conveyor, automatic cleaning unit for removing chips from fixtures, J.I.C. Standard Construction.

Established 1898

THE CROSS CO.

DETROIT 7, MICHIGAN

Special MACHINE TOOLS

Engineers for Tomorrow

By Wm. Mitchell Trevarrow
Asst. to Commanding Officer
Detroit Arsenal

THOUSANDS OF YOUNG ENGINEERS are graduated from our colleges and universities every year, but for every graduate there are from three to five jobs. Estimates of how long this shortage will continue vary from five to twenty years. To reduce the effect of this shortage, it is necessary to use all engineering talent to the fullest degree possible.

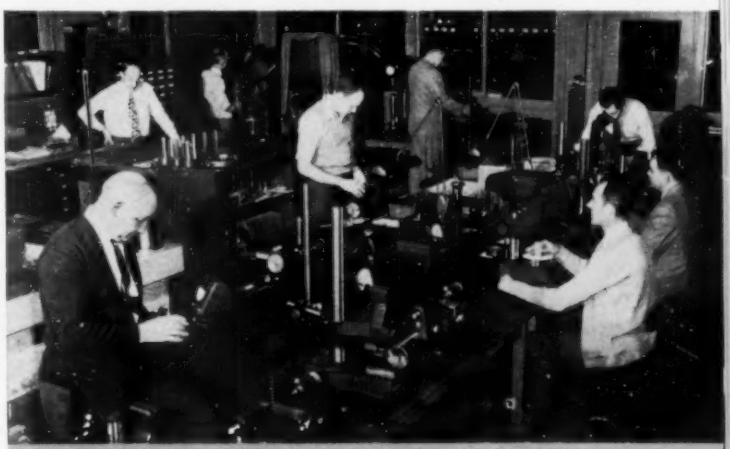
Engineers who have just graduated from college are simply not prepared for work in industry. It takes as much as five or six years before they become a real contributing factor in our system of production. While universities have done an excellent job preparing young men for their profession, classroom training must be supplemented by work on the job for practical engineers.

Many manufacturers have established training programs for young engineers entering their employ. Generally, these programs accomplish two purposes: They lessen the time needed to gain experience before an engineer can be of value to the organization and they provide the broad, generalized background that makes a successful specialist.

For more that two years, the Detroit Arsenal, center of the Army's vehicle design and engineering agencies, has operated a training program that is tailored to fit its needs. This program can, however, be adapted to any industrial engineering organization. Individual guidance and the widest variety of experience possible are the keystones of the program. As a result, its success is limited chiefly by the facilities available and the effort expended by supervisory personnel.

Engineers-in-training at the Detroit Arsenal are directed and advised by men who are experienced in the automotive and Ordnance fields. These men, because of their many years in the industry, have acquired specific knowledge and techniques that can be passed on to the younger engineers. This guarantees a continuity of operation and makes it unnecessary for a trainee to repeat the mistakes made by others. Thus, he is provided with an already accumulated fund of experience.

Before he can successfully specialize, every engineer must gain a broad, generalized knowledge of all subjects affecting his field. This background is provided by arranging for every trainee to work in a number of different shops and laboratories. From such diversified experience, he gains a consciousness of cost as it relates to design and production. He acquires a thorough familiarity with existing components and materials. Finally, he learns the extent to which the work and problems of men in other fields affect his own particular phase of a job.



In the gage inspection laboratory, engineer trainees learn the interdependence of design, production and inspection fields.

Although design and production engineers deal with the same end product, their problems are different. If the most efficient results are to be achieved, the design engineer must understand the limitations imposed upon the production engineer and the production engineer must realize the goal toward which the design engineer is striving. Only then can each effectively supplement the work performed by the other.

While working in the shops, an engineer is able to hold in his hands the objects he will eventually design, test, or produce. In this way, he gets a practical background so essential to his well-rounded development.

Throughout the training period, seminars are held every two weeks. At these meetings, papers are read by recognized authorities and the engineers-in-training are provided an opportunity to discuss their work. Thus, they are able to synthesize the information and experience they have accumulated.

Training Program: A typical young engineer at the Arsenal is employed upon graduation from college. He has a sound theoretical background for his selected branch of engineering, but little or no practical knowledge. Before beginning his training he is interviewed by the coordinator of the junior engineer training program. In this interview they discuss his interests, the subjects in which he is most proficient, his past experience, and his eventual goal. A program is prepared which will supplement and broaden the experience he has had in the past. During the fifteen-month training period, he will spend from four to six weeks in each of nine laboratories or shops. These nine are selected from more than forty as the ones that will contribute most to his personal professional development. Other trainees are assigned to entirely different sections.

For instance, he may be assigned first to the power plant and control section. During the early weeks, he will spend a great deal of time becoming familiar with the organization, procedures followed, and key personnel. His first project is with the group conducting the deep water fording tests of a new vehicle. This is one of the most dramatic tests undertaken at the Arsenal. During the operation he gains experience in the compilation of the necessary test data.

Upon completion of the deep water fording tests, he works on the detailing and layout of the steering and shifting mechanism for a new vehicle. With the aid of a supervising enginer, he learns the use of Ordnance standards on details and layouts and how to obtain material and welding specifications. From the engineers on the job he also learns how to obtain drawings from the master files, revise drawings, and use the standard parts book.

He is then reassigned to the electrical and running

(Below) Working with the gage designer, the trainee learns some of the problems of maintaining standards in production, faced by tool engineers in both industry and Army Ordnance.

(Right) New air cleaners for Ordnance engines are being prepared for dynamometer test by trainees under the supervision of test engineers.



gear section. While in this section he makes weight calculations and stress analyses, prepares job sheets, and becomes acquainted with experimental drafting room practices. He also learns to use a mechanical calculator and make layouts of electrical equipment.

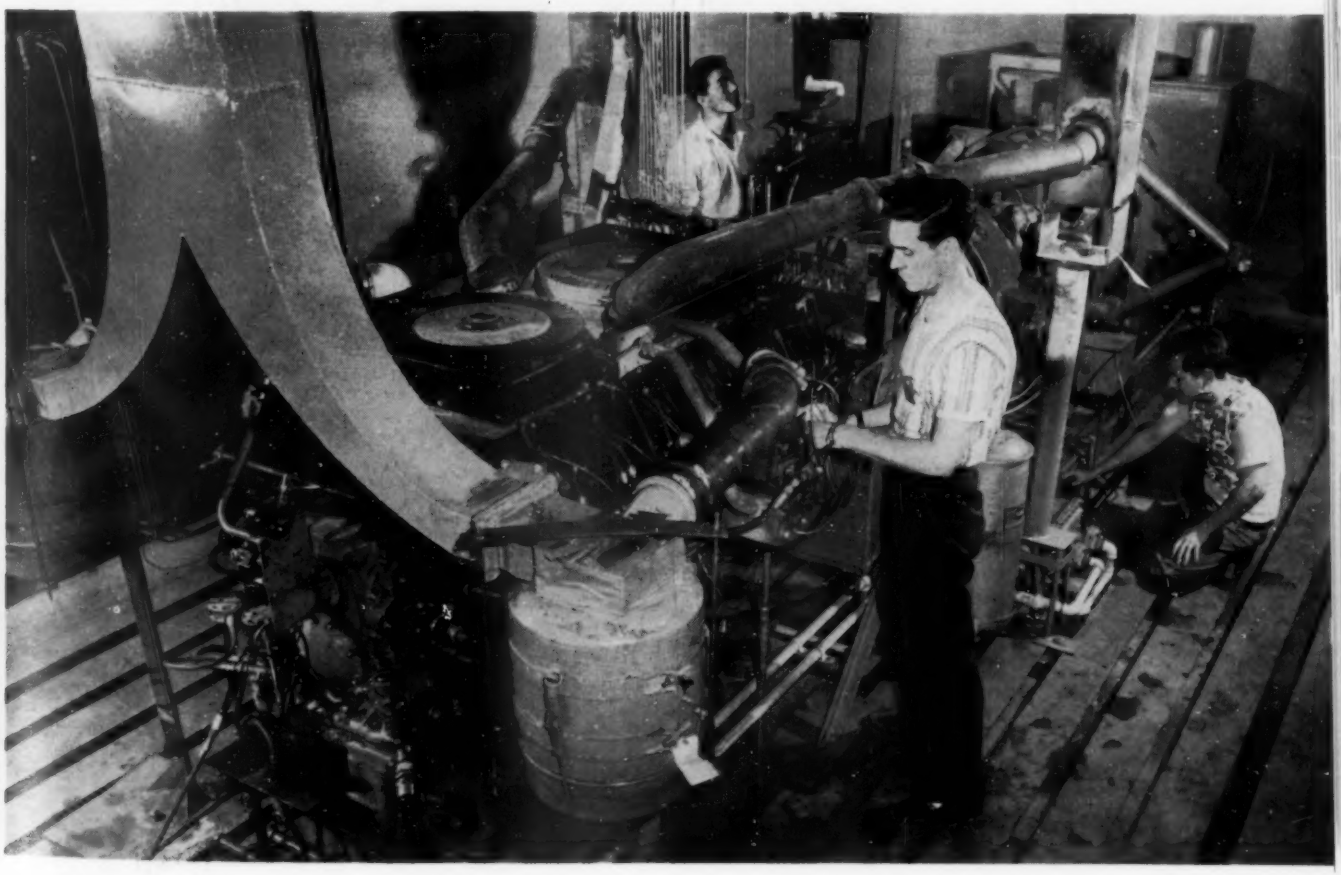
The preliminary concept section is his next assignment. He is able to follow the evolution of a new tank from design and layout of the hull to the allocation of space for various components. For the first time he realizes the amount of work that is done before any drawings are made. Much of his time is spent searching through blueprints of other vehicles in an attempt to find parts already in existence which could be used on the new tank. In some cases, parts perfectly suited to his need can be found. In other instances, a slight modification renders an existing part usable. He learns, in this way, the close relationship betwen cost, production, and design. It is impressed upon him, at the same time, that production could be greatly speeded by using existing components. As a design engineer he gives assistance to the production engineer by using existing parts which would reduce initial tooling costs.

The armament section is responsible for the design of gun mounts and elevating and traversing mechanisms. When the young engineer is assigned here he might work on the traversing mechanism for a medium tank. Were it not for the assistance of the supervising engineer he would face an unsoluble dilemma. With proper guidance, however, he is able to secure the required data, make his calculations, and arrive at the answer.

He is next transferred to the engineering records section. This section is charged with the maintenance of all engineering change orders for the component parts of all Ordnance vehicles. While in this section, he becomes acquainted with the engineering change forms and the engineering release forms which are basic factors in Ordnance production engineering.

In the turret section, to which he then transfers, he may work on the design of a boom for a tank recovery vehicle. A stress analysis of the boom is made to determine the proper diameter of the pins that would secure the boom to the hull of the vehicle. It is also necessary to fix the center of gravity for the inter boom and its adjacent parts. The trainee is saved from making many mistakes by the engineer in charge of the project. Thoughtful supervision during his four-week stay in the section prepares him to meet stress and design problems in the future. He is benefited greatly by actually working on the vehicle while making his computations. In this way, theory and practice are made more meaningful and related to each other.

When he leaves the turret section he is assigned to the hull section. This group is also engaged in work on the tank recovery vehicle. The trainee is



directed to assist the engineer in charge of the project. For four weeks he works on stowage problems. A tremendous amount of equipment has to be carried on this vehicle. Space has to be allocated and hardware either found or designed to hold the equipment in place. To reduce cost, the trainee is told to use as many standard mounting brackets as possible. The goal toward which the section is working is maximum efficiency combined with minimum production costs.

His next assignment is in the low temperature laboratory where he assists in the conduct of Arctic oil tests. A Continental engine is used for the tests. Dimensional checks are made before and after each test and all surfaces exposed to the oil are measured or weighed. He is made more conscious of the interrelationship between the work he performs and that performed by men in other sections. It is necessary to gather data from the engine and power train laboratory, the fluid flow section and the fuels laboratory before the tests can be successfully concluded. All of the gages used must be checked at the gage laboratory before each test to determine their accuracy. In the opinion of many engineers, consciousness of the importance of the work performed by other men in other parts of the organization is the most important thing learned in the entire training program.



Finally, the traineee is assigned to the engine and power train laboratory. Directed by the engineer in charge he makes calculations for an engine and plots curves indicating power, torque, bhp, ignition timing, and specific fuel consumption.

While in training the young engineer attends more than twenty seminars. These supplement the experience and instruction he receives on the job. They enable him to broaden his background to include phases of engineering with which he otherwise would have little or no acquaintance.

Job Selection: Upon completion of the training program, the trainee is given an opportunity to indicate three sections in which he would like to work. For instance, he may choose the special purpose vehicle section of product engineering, the power train and engine laboratory, and the experimental model division. These selections are checked against his grading sheets. A separate sheet has been completed for each section in which he worked. They grade his aptitude for the work, his professional growth, and his ability to work with the other men in the section. If the trainee scores high in each of the sections for which he declared a preference, he is assigned to the division where the need for engineers is the greatest.

It has been found that the training program provides men well-equipped to work in the production engineering field. They have gained, in fifteen months, a breadth of experience it would otherwise take years to acquire. They are prepared to play a contributing part in the production program. In a short time, they will be able to play an active part in production engineering of Ordnance vehicles.

The goal of an effective training program is to provide the Ordance Corps and industry with experienced engineers in a minimum time. To the extent that the program is used by industry and Ordnance, it is possible to reduce the critical shortage of personnel. Ordnance officials believe that approximately four years are saved by this program in fitting an engineer for a responsible position in our production system.

(Top left) In the model pattern shop, trainees take part in the construction of scale mock-ups of vehicle and engine components. In this way, trainees see the development of a drawing into a three-dimensional reality.

(Lower left) Modern equipment and guidance of veteran engineers permit rapid training of new employees, as in the staging laboratory where aging and weathering tests determine the effects of temperature and climate on component parts.

(Below) Trainees and experienced engineers work side by side while testing electrical components for performance factors. Here the trainee develops an appreciation for detailed work so important in engineering.



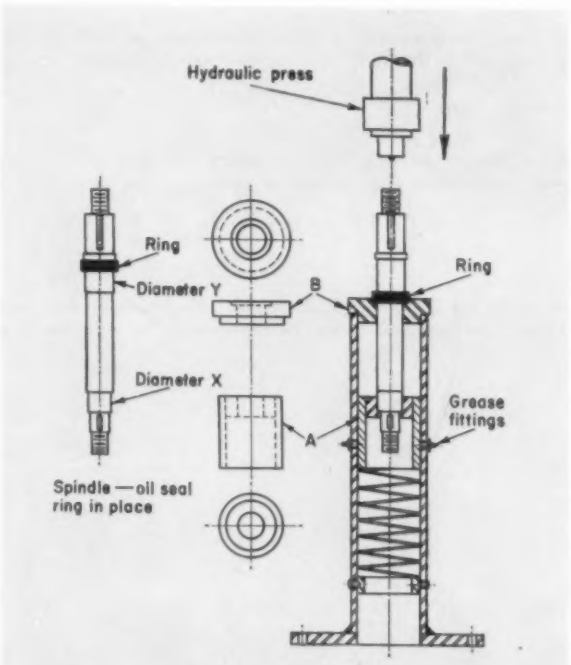
Gadgets

Ingenious Devices And Ideas To Help The Tool Engineer In His Daily Work

Press Guide

Difficulties arose in pressing the ring for an oil seal on a spindle-type part with a hand arbor. The operation was slow and occasionally a ring would be started crooked, scoring the spindle. These marks had to be polished off before the bearing could be installed.

The press guide pictured in section was designed to eliminate the trouble and speed up production. The main body is steel tubing to which a plate is welded for a base. The tubing was bored out to clean it and the base was faced. Part *A* is a cast iron bushing turned for a sliding fit inside the tube. A steel sleeve was pressed into the bushing and bored out to admit diameter *X* of the spindle. Part *B* was bored to receive diameter *Y* of the spindle. In addition Part *B* was counterbored to the



maximum outside diameter of the oil ring to be pressed on, adding an allowance for a slight ring expansion.

A compression spring of sufficient length and strength to return bushing *A* to position shown was installed in the press guide. The spring seat is held in place by setscrews.

W. H. Saling
Senior Member ASTE
North Texas Chapter

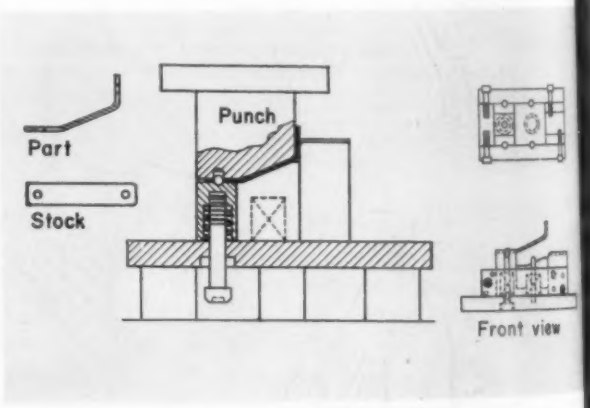
Short Run Die

This die was designed for making short runs of formed parts. The part itself is not complicated, but the die has several features which might be useful in other applications.

The part shown here is an aircraft bracket. The vertical member's distance from the hole in the horizontal arm is very delicate, and must be held to very close tolerances. The part is formed from standard cold rolled strip, cadmium plated after two aircraft nuts are welded on.

The locating button is a steel bearing ball which matches the size of the punched hole. The ball is brazed into a hole in such a position that the greatest diameter of the ball is just above the die into which it sets. This ball is cheaper, easier, and quicker to use than a spherically capped steel pin. In dies designed to run a few thousand pieces any savings possible are worthwhile.

As shown in the top view, the die consists of a box in which the two bending die parts float. These, with the punch, do all of the bending. These die parts are held in place by a cap screw from the bottom, ride on a die spring, and are positioned in the die box by two dowel pins. The holes for

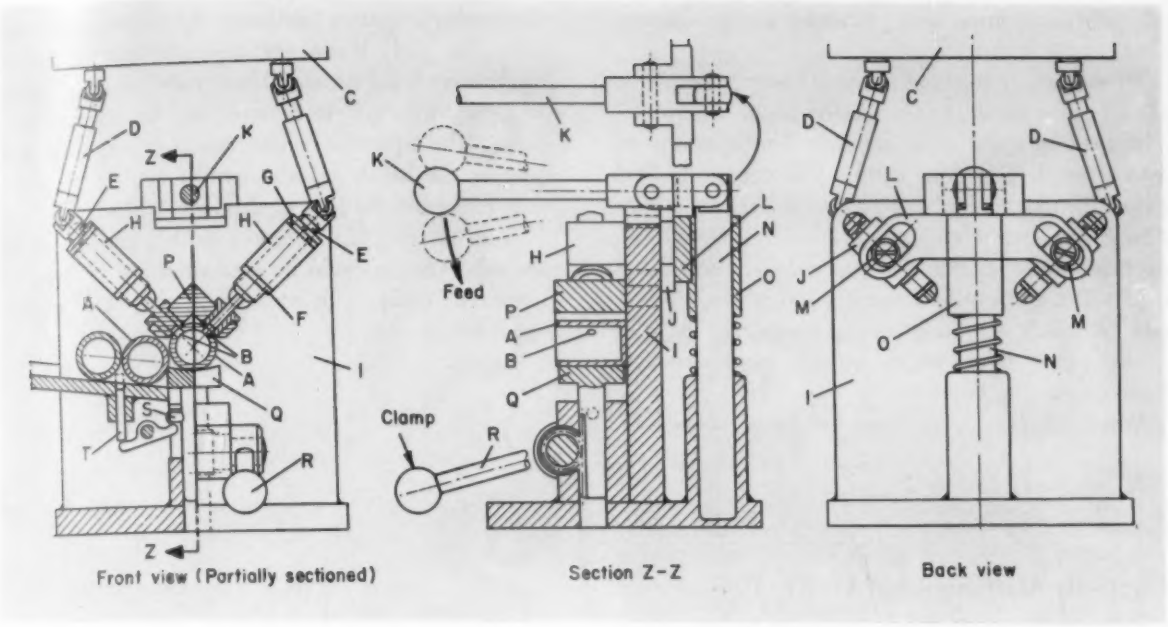


these dowel pins were drilled in the crack between the die and the die box before these parts were hardened, and the dowels were placed during the final assembly of the die. The dowels not only give smoother operation of the die, eliminating any need for close fits between the die parts, or between the die parts and the box. The die can also be run with only one bend in the part.

Frank M. Butrick
Junior Member ASTE
Western Mich. Chapter

of speedy operation and simplicity of jig construction.

the inclined guide, isolating the one nearest the



Angular Drill Jig

Large quantities of hollow cylindrical components were to be drilled at two points; the hole centerlines to meet at the axis of the cylinder. For greater production it was decided to drill the two holes in each component by a single downward movement of the drill feed lever. As this necessitates traversing the drilling spindles at an angle to the vertical, the required jig is unusual.

A standard two-spindle drilling unit *C* was attached to the spindle of a standard ½-inch sensitive pillar drill press. The drill spindles, protruding from the bottom of the gearbox of the unit, are modified to take a pair of ball-type universal joints. The drive from the two-spindle unit is through telescopic sleeves *D* to a second pair of universal joints which are fixed to the upper ends of the angular drilling spindles *E*.

The two drilling spindles are plain hardened and ground members with thrust collars *F* machined integrally. The lower ends of the spindles are bored to suit the shanks of the drills used and these are secured in place by headless setscrews. The upper ends of the spindles carry pairs of thin nuts *G* for adjusting end-play.

Housings *H* are solid pieces of antifriction bronze alloy so that the spindles can run directly on the walls. The rear face of each housing has a protruding tongue which engages a slot machined in the vertical plate *I* of the jig body. The tongues slide in the slots, which, at 45 degrees to the jig centerline, guide the drill spindles in the desired path. A bronze keep plate *J*, fastened to each housing at the back of the jig plate, provides a close sliding fit.

Pulling down the upper handle *K* causes both spindle housings and drills to move in unison toward the component axis. Reference to the back view *X* of the jig will show that downward movement of the handle causes the yoke-shaped plate *L* to move down also. Elongated holes cut through the extremities of plate *L* engage with rollers *M* which are attached to the backs of the sliding drill spindle housings, thus converting the vertical pull of the lever to the angular movement desired for the drills. Plate *L* is restricted to a vertical path by means of the upright circular guide pillar *N*, to which it is attached by means of the welded-on bushing *O*. The pillar is fixed in a hole in the circular supporting piece which is attached to the fixture base plate. A compression spring returns the yoke piece *L* and the drilling spindles to the upper position whenever the feed lever is released by the operator.

As shown in the front view, the drills are supported and guided accurately by a pair of hardened drill bushings which are pressed into V-block *P* mounted on the front face of the jig plate. This V-block is used in an inverted condition and the components are forced upward into it during drilling. Contrary to usual practice, the drilling pressure is taken by a movable member.

Clamp pad *Q* forces the components upward into the V-block. The pad is mounted upon a circular guide bar which fits in a hole bored in a housing block welded to the jig body. The guide bar and clamp pad are moved upward by means of the handle *R* which actuates a toothed pinion engaging with rack teeth cut into the guide bar. The component is held during drilling by the operator's pressure on handle *R*. This is a natural movement for the operator and no difficulty has arisen from lack of positive locking during drilling. This arrangement is advantageous also from the viewpoint

of speedy operation and simplicity of jig construction.

In operation workpieces feed down a simple inclined guide on the left-hand side of the clamp pad. The loading cycle is as follows: The operator releases the drill-feeding handle and the drills back out of the part under the action of the return spring. The end of the clamping lever is raised and the operator pulls out the finished cylinder and drops it in a bin. Lifting the clamping lever lowers clamp pad *Q* which, in turn, pushes down pin *S*. This causes pin *T* to move up because of the rocking lever connecting them.

When pin *T* is up, it stops the line of blanks on the inclined guide, isolating the one nearest the clamping pad. When the clamping pad is empty and lowered, the isolated blank rolls onto the clamping pad, where it is centered by the concave surfaces. The operator raises the clamping pad and presses the blank axially against the jig plate before clamping the part against the V-block.

With this jig, the operator drills a part every 10 seconds. The jig could be mechanized to work on an automatic cycle, without a great amount of capital expenditure.

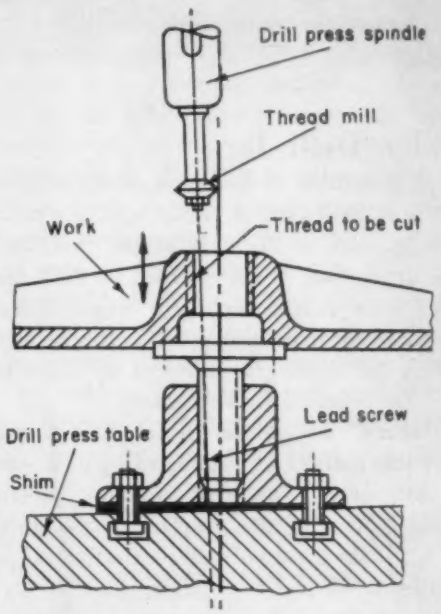
F. E. Riley
London, England

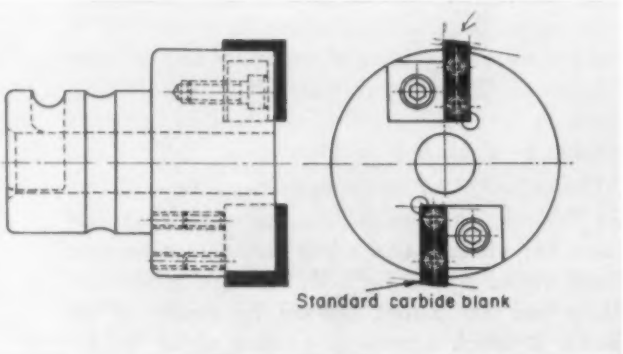
Thread Milling on Drill Press

When a threading job is too large to be worked on a lathe with a lead spindle, it can be done on a drill press by means of the simple gadget illustrated. The example shown is a chuck for a spinning lathe. Accuracy has been found to be fully satisfactory.

The setup, as shown in the accompanying figure, consists merely of a thread mill chucked in the spindle of a drill press and a simple fixture to hold the work on the table. The fixture must be inclined at an angle in accordance with the lead angle of the thread to be cut. The spindle of the drill press is locked in position and the work is turned by hand to feed it into the cutter. Obviously the pitch of the screw in the fixture must be the same as that of the internal thread to be cut in the workpiece.

Adelbert Eichler
Senior Member ASTE
Toronto Chapter





Special Spotfacers

As tool engineers well know, carbide-tipped spotfacers in large sizes are expensive, especially as one or more of the multiple flutes are easily damaged or broken. It was found that to serve in this particular application in the manufacture of farm implements, that two flutes were sufficient to spotface on cast iron. A considerable savings in tooling cost was secured by designing a spotfacer to use standard carbide blanks. When one of these tools is damaged, the blanks are replaced and ground in the holder for a fraction of the cost of a new brazed spotfacer.

Frank Rozek
Davenport, Iowa

Contributions for these pages describing short cuts for the tool engineer are welcome. Finished drawings are not necessary. Payment for accepted articles is made upon publication.

Table 1—Evaluation of Stanton and Hyde Machinability Tests

Metal-Cutting *Friction Coefficient* needs reinterpretation

By Dr. M. Kronenberg*

Consulting Engineer

Cincinnati, Ohio

NUMEROUS DISCUSSIONS of the coefficient of friction in metal-cutting have led many tool engineers to assume that a low coefficient is desirable. It is often believed to indicate low frictional forces, low tool temperatures and consequently good tool life. Such assumptions are erroneous. It is the purpose of this article to call attention to the fallacy of such reasoning and to correctly define the coefficient to prevent further confusion.

Referring to *Fig.* 1, which represents a two dimensional cutting process performed on a planing machine, it can be seen that the total (or resultant) cutting force R, which the chip exerts on the tool can be resolved into two components. One of these components F is acting parallel to the tool face and the other one N normal to the tool face. The component F represents, therefore, the frictional force existing between chip and tool face, while the other component N represents the force with which the chip pushes against the tool face. The ratio of the two components, namely F/N, is commonly known as the coefficient c of friction in metal-cutting.

Surprising conclusions are reached by analyzing results of tests where these two force components have been measured. An early analysis was published in 1927 in a book by the author on "Principles of Metal-Cutting Science." The particular tests referred to were run in England by Stanton and Hyde. Another series of tests from which the two components F and N could be computed were carried out at the Massachusetts Institute of Technology by Shaw, Cook and Finnie in 1952 on SAE 1112. Results were presented before an ASME meeting in Cincinnati.

*Senior member ASTE Cincinnati chapter

The computed data of frictional and normal forces published in the aforementioned book, are shown in TABLE 1. The data computed from the MIT tests appear in TABLE 2. From these tests it can be seen that the coefficient of friction increases with increasing true rake. This is contrary to the common conception. The coefficient of friction would be expected to decrease when the rake angle increases because it is usual to associate a low coefficient of friction with low friction force and hence with increasing rake.

An inspection of the tables, however, shows that the increase in the coefficient of friction does not mean that the friction has increased, but rather that the normal force N has decreased, while the friction force remains nearly constant. Often, the apparently undesirable increase in the coefficient of fric-

Fig. 1. Forces involved with single point cutting tool

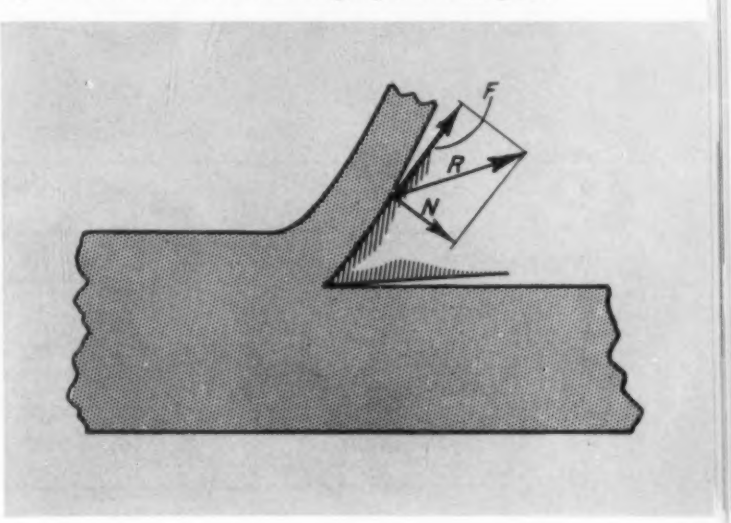


Table 1—Evaluation of Stanton and Hyde Machinability Tests

Material	True Rake of Tool (degrees)	Frictional Force *F* (lb)	Normal Force *N* (lb)	Ratio *F/N* (coeff. of friction)
Cr. Ni. St.	5	229	341	0.67
	15	230	270	0.85
	25	231	203	1.14
Soft steel	5	206	306	0.68
	15	190	242	0.79
	25	190	190	1.00
Medium steel	5	220	317	0.70
	15	220	260	0.85
	25	219	200	1.10
Tube material	5	200	331	0.60
	15	203	250	0.81
	25	200	190	1.05
Copper	5	137	205	0.67
	15	115	170	0.68
	25	93	132	0.70
Bronze	10	226	350	0.65
	15	236	332	0.71
	25	230	270	0.85
Cast Iron	5	130	190	0.68
	15	139	152	0.92
	25	137	115	1.19

tion is caused by the desirable fact that both force components decrease and that the normal force drops faster than the friction force (as soft steel in TABLE 1). Hence, the coefficient of friction increases although both force components decrease.

In the formula for the coefficient of friction, $c = F/N$, when N is decreasing faster than F, the coefficient of friction increases, leading to misinterpretation. It can be seen from the tabulated data that the normal force actually drops when the rake angle is increased, although the coefficient of friction increases. A desirable feature thus appears undesirable under the common interpretation.

In a further instance, Cr. Ni. St., TABLE 1, the friction is constant at 230 pounds regardless of rake, while the normal force drops from 341 to 203 pounds. In spite of this desirable reduction in normal force, the coefficient of friction increases from 0.67 to 1.14, giving the incorrect impression that something undesirable has happened, though the contrary is true.

Other tests recorded in TABLE 2 also show the force components decreasing while the coefficient of friction rises. Thus, in reality a high coefficient of friction fails to indicate high friction.

The contrary conclusion that a low coefficient of friction indicates a low cutting force, good tool life or good surface finish is untenable also. Considerably more care should be exercised in dealing with terms like coefficient of friction in metal-cutting. It should not be used for judging forces, tool life, heat and surface finish.

Probably it will be necessary to split the coefficient of friction into two or more coefficients, one referring to the chip-tool interface, as is done now, and another one referring to internal friction in the shear plane. More basic and applied research is required to correct the harm done by assuming that the coefficient of friction is an indication of cutting performance.

Table 2—Evaluation of M.I.T. Machinability Tests

Coolant	True Rake of Tool (degrees)	Friction Force (lb)	Normal Force (lb)	Ratio F/N (coeff. of friction)
Benzene	30	778	767	1.01
	45	684	516	1.33
Dry	16	680	1015	0.67
	30	568	658	0.86
	45	550	458	1.20
Ethanol	16	414	862	0.52
	30	353	518	0.68
	45	368	380	0.97
Carbon Tetrachloride	0	109	816	0.13
	16	189	575	0.32
	30	222	450	0.49
	45	288	370	0.78

WEAR of Carbide Tools

–its effect on surface finish and dimensional accuracy

By A. J. Pekelharing and R. A. Schuermann

Philips Co.
Eindhoven, Holland

IT IS WELL KNOWN that wear determines the life of carbide turning tools. Research on tool wear[1] has generally been confined to wear on the clearance face under the cutting edge of the tool and to wear on the top face. In roughing operations it appears that these forms of wear are decisive. A wear land of 0.030 inch on the main clearance face has been widely accepted as a criterion signifying the end of tool life for practical purposes.

Progress made in Holland in the standardization of surface roughness led to an investigation of finish turning with single-point tools. In the course of this work it became clear that the wear occurring on the end clearance face of the tool, illustrated in *Fig.* 1, is important. In finishing operations this form of wear determines tool life in contrast to roughing operations where it is less of a factor. In addition, wear on the end clearance face has an influence on surface condition and dimensional accuracy that cannot be disregarded.

Little quantitative data has been published concerning the influence of tool wear on the surface roughness produced in finish turning. Investigations[2] of the effect of tool form and feed on surface condition are of little practical value as long as the tool form is regarded as a fixed quantity.

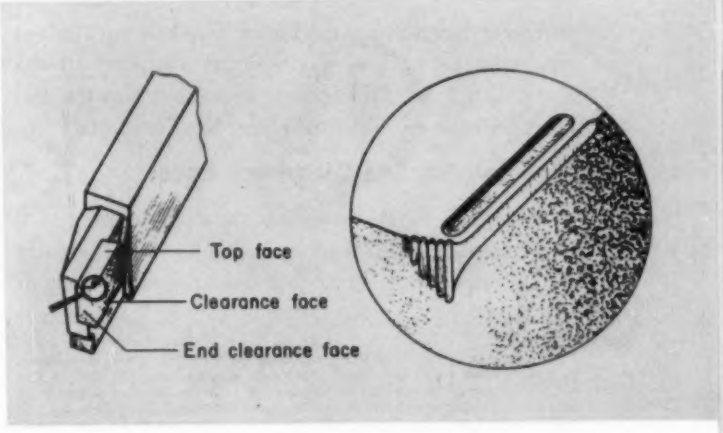
Wear at the Tool Nose

To present a clear picture of wear phenomena at the tool nose and their practical consequences an analysis of the form and progressive development of wear marks occurring on the end clearance face of a tool follows along with a discussion of the effect of wear on surface condition and dimensional accuracy of the workpiece.

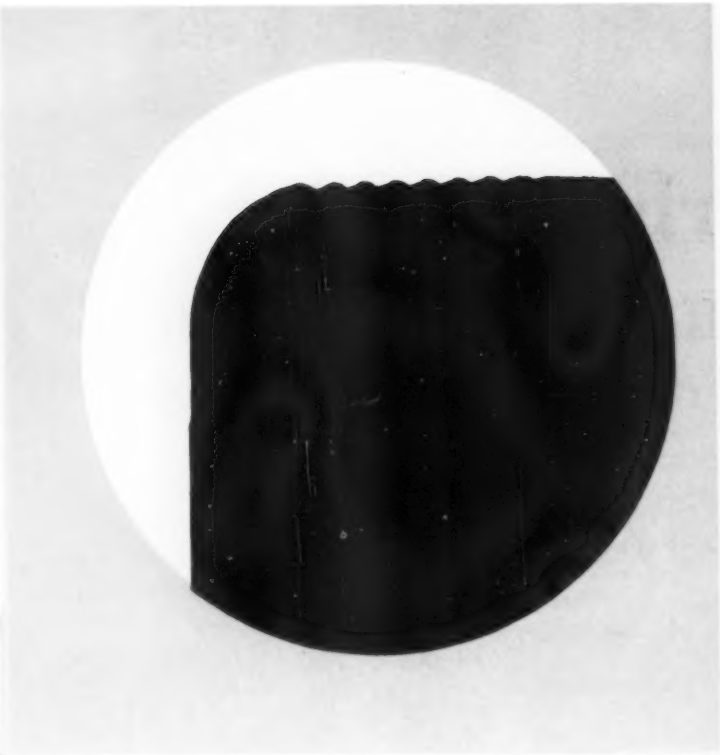
Wear on the clearance face of a carbide tool, caused by finish turning, is illustrated in *Fig.* 2 which gives the actual top view of a worn cutting tool as seen through a microscope at 40 magnifications. The illustration shows a straight-side cutting tool of a steel cutting grade of carbide (15%TiC, 6%Co, 79%WC) after 50 minutes turning on free machining steel (B1112) under the following conditions: cutting speed, 300 fpm; depth of cut, 0.020 inch; feed, 0.004 ipr; and tool path length, 15,000 ft. In the end-clearance face of the tool, immediately behind the tool nose, a row of grooves has appeared. The spacing between grooves corresponds exactly with the feed per revolution.

The profile of the grooves and ridges is reproduced accurately in the workpiece. This is clearly shown in Fig. 3. The profiles[3] were recorded with a

Fig. 1. Three forms of wear on a carbide tool. The enlargement represents the nose area within the circle.



[1] References in numerals are tabulated at the end of article.



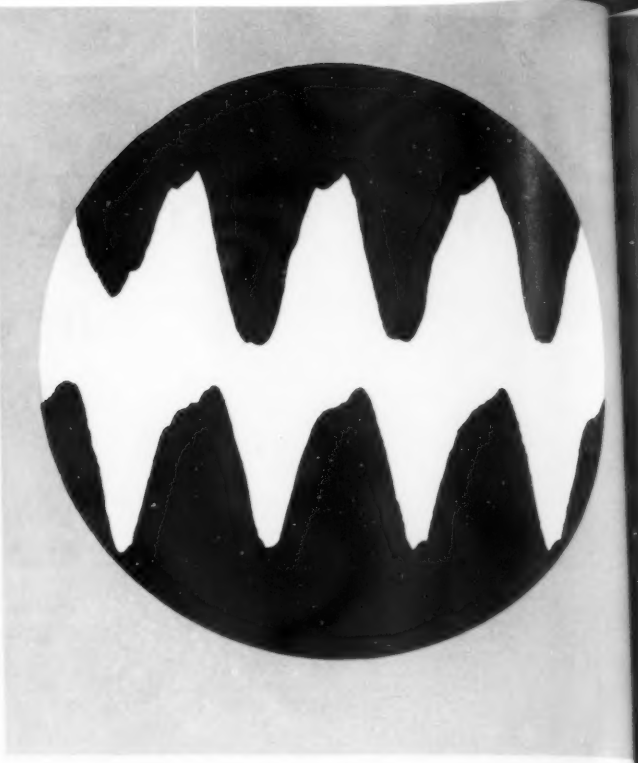


Fig. 2. (top left) Silhouette showing wear on the end-clearance face for a straight side carbide tool. Magnification 40x.

Fig. 3. (top right) Wear profiles of tool and workpiece. The top is the workpiece; the bottom is the tool. Horizontal magnification, 200x; vertical, 2000x.

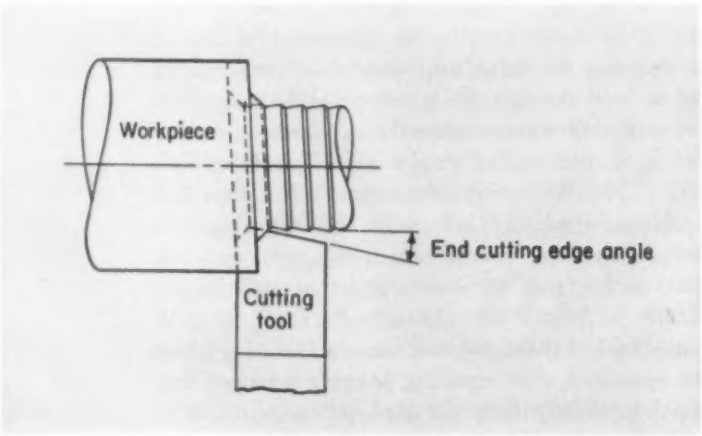


Fig. 4. Exaggerated sketch of surface generated in single-point finish turning operation.

Forster instrument*. The profiles are slightly distorted by the tip radius of the stylus; if corrections are made for this distortion the mating of the profiles is even closer.

The effect of the original nose radius of the tool on the surface profile of the work is completely lost and wear has become the factor determining surface condition as well as dimensional accuracy of the work, hence the tool is now somewhat shorter and the diameter of the workpiece has increased.

Wear on the End Clearance Face

In *Fig.* 4, finish turning with a single-point tool is illustrated with feed and depth of cut greatly exaggerated. It is clear that only the small part of the end face of the tool in contact with the work is subject to wear. Likewise it is obvious that the form of this part of the tool determines the surface profile of the workpiece. Changes in the form of the tool through wear will immediately influence the surface condition and the dimensional accuracy of the work.

Successive stages in the development of wear grooves in the end clearance face of the tool are illustrated in the diagrams, *Figs.* 5*a* to 5*h*, for a straight turning tool having a slightly chamfered corner. The end cutting edge angle and dimensions of the wear grooves have been exaggerated for greater clarity.

For every revolution of the workpiece the tool advances a distance equal to the feed. If the tool cuts ideally, the profile of the tool marks will correspond exactly with the form of the tool nose, *Fig.* 5*a*. From this theoretical surface profile a theoretical value for the surface roughness can be calculated. In practice the tool does not cut in an ideal fashion and the measured roughness will generally be higher than the theoretical value.

After a short time a small groove develops in the end face of the tool, starting at the end cutting edge, *Fig.* 5*b*. This groove appears behind the apex of the tool at a distance slightly less than the feed. The

*The Forster instrument for measuring surface finish was developed in cooperation with the Leitz Company in Germany. It checks the actual profile of a surface in steps with a feeler having a sapphire point whose movement is magnified and recorded on a film by the reflection of a light beam from a mirror connected to the feeler.

decrease the depth of the grooves and to improve the surface condition of the work. *Fig.* 5*h* illustrates

stages of wear numbered 1, 3, 5, 7, 9, 10, and 11 correspond with lengths of tool path over the work

starting point of the groove is located at the intersection of the end cutting edge of the tool and the surface of the workpiece, i.e., in a transition zone between the working and idle parts of the tool edge.

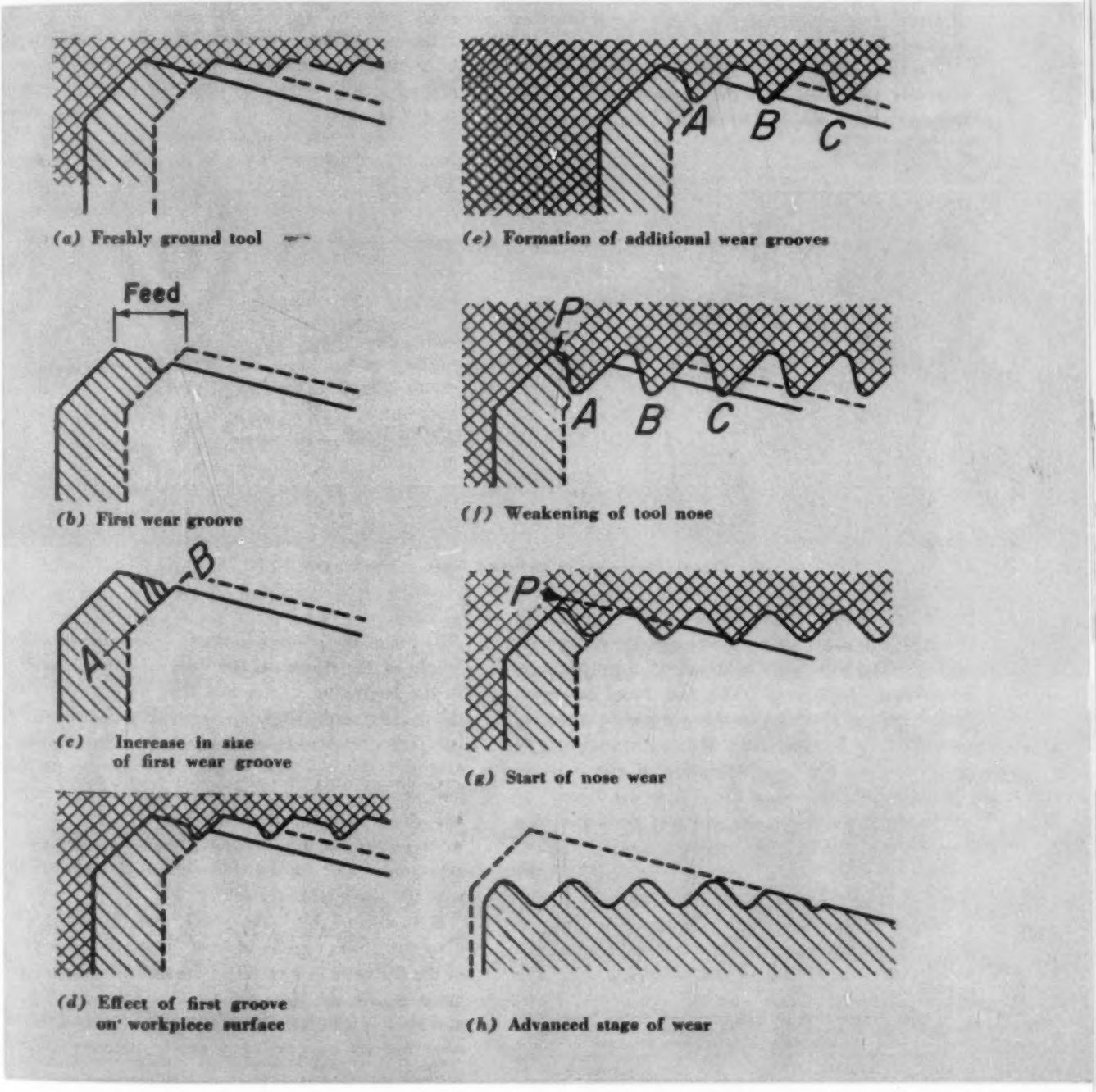
The groove can only develop to the left of the line *AB* in *Fig.* 5*c*, since the tool does not engage the workpiece to the right of this line. As the groove deepens it moves to the left, along the line *AB*.

The change in tool profile is reproduced in the surface of the workpiece, *Fig.* 5*d*. The diameter, as measured by conventional methods, has increased. At this stage no wear can yet be measured on the tool as is the case in later stages, *Fig.* 5*g*.

As the ridges on the work increase in height they will touch the end cutting edge at *B*, *Fig.* 5*e* after a certain time, dependent on the magnitude of the end cutting edge angle, and form a second groove there. The two grooves increase in depth simultaneously and a third groove appears at *C*. This process continues in some cases until ten to twenty grooves have been formed in the end cutting face of the tool. *Fig.* 5*f* shows how the tool apex at *P* becomes considerably undermined by the neighboring groove. The wear at *P* takes place rapidly when the depth of the groove at *A* has reached a certain value.

The wear that has set in at *P*, *Fig.* 5*g*, tends to

Fig. 5. Successive stages in the failure of a single-point, finish-turning tool.



(a) Freshly ground tool

(b) First wear groove

(c) Increase in size of first wear groove

(d) Effect of first groove on workpiece surface

(e) Formation of additional wear grooves

(f) Weakening of tool nose

(g) Start of nose wear

(h) Advanced stage of wear

decrease the depth of the grooves and to improve the surface condition of the work. *Fig.* 5*h* illustrates the condition of the tool after a considerable period of cutting.

As a result of the formation of grooves, nose wear has made considerable progress. At a certain stage vibration or sparking may set in. In practice this indicates the end of tool life. Vibration gives rise to a characteristic surface pattern and sparking on the work due to these ridges may occur.

The side clearance face and the adjoining part of the nose radius show signs of wear as well as the end clearance face. The wear on the latter part of the tool, however, generally develops rapidly.

The wear process that was outlined in the diagrams of *Fig.* 5 is shown in a superimposed series of actual wear patterns in *Fig.* 6 which was obtained in the following way.

The tool was removed from the lathe at regular intervals to photograph the grooved nose profile through a microscope. The depth of the grooves was checked with a Schmalz† microscope for greater accuracy. Negatives were enlarged on a projector to a total magnification of 1000x and traced on paper. The drawings obtained in this way were correctly positioned by locating from the unaffected parts of the tool edge. Final magnification of *Fig.* 6 is approximately 135x.

The tool is a steel cutting grade of carbide with a nose radius of 0.02 inch; workpiece material, free machining steel B1112; cutting speed, 300 fpm; depth of cut, 0.02 inch; feed, 0.004 ipr.

Successive stages of wear discussed in the preceding diagrams can be recognized in *Fig* 6. The stages of wear numbered 1, 3, 5, 7, 9, 10, and 11 correspond with lengths of tool path over the work surface of 300, 1200, 4200, 9900, 14,700, 21,600, and 27,900 feet respectively.

Surface Finish and Dimensional Accuracy

The fundamental consequences of nose wear and the formation of grooves in the tool are illustrated in exaggerated fashion in *Fig.* 7.

As a result of the formation of grooves the surface roughness increases. The height of the ridges left on the work increases, giving rise to an increase in the diameter of the work. Also, the diameter of the work is increased by nose wear which follows the formation of grooves. *Fig.* 8 further illustrates, quantitatively, the effect of groove formation and nose wear on surface roughness and workpiece diameter. In this test, the workpiece material is 5-inch diameter free-machining steel (B1112), with cutting speed, 300 fpm; depth of cut, 0.02 inch; feed, 0.004 ipr.

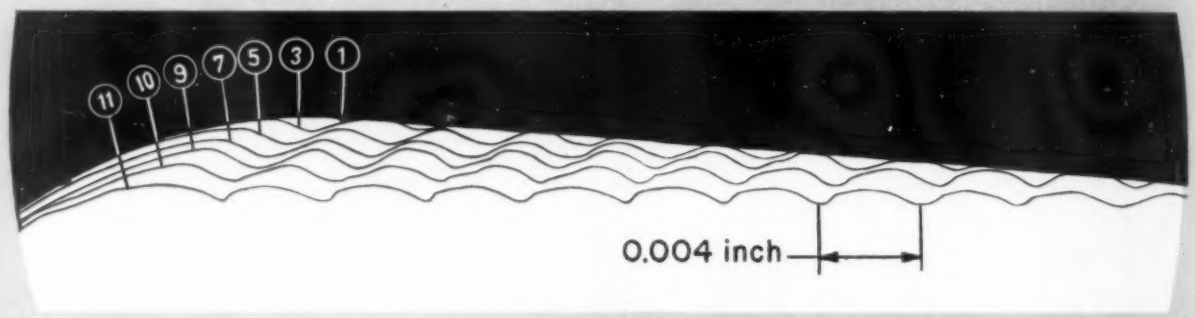


Fig. 6. Nose wear in its actual form, magnification 135x.

Depth of the grooves in the tool, and consequently height of the ridges on the work, increases rapidly in the beginning. After this first stage the groove depth fluctuates slightly, remaining substantially constant. Nose wear increases approximately linearly with the tool path length. The increase in the half diameter of the work is the sum of nose wear and groove depth. Results plotted in *Fig.* 8 and wear profiles in *Fig.* 6 were obtained in the same experiment and numbers in the graph correspond with the same numbers in *Fig.* 6 .

It is evident from the graph that the workpiece diameter grows rapidly at first. This initial increase of the diameter is a result of the rapid formation of grooves. By the time the grooves have developed and their depth has become nearly constant, nose wear has set in, causing a slower increase of the work diameter.

† The Schmalz microscope for measurements of surface finish, made by Carl Zeiss, Germany, permits visual inspection and measurement of surface irregularities. A light beam, projected through a slot at an angle under 45 degrees upon the workpiece surface, can be observed through a microscope. The view is a cross-section of the surface which can also be recorded with a photographic camera.

	Cutting speed	Feed rate	Carbide

Growth of the diameter then continues at a fairly constant rate until the end of tool life is reached. In this experiment the formation of grooves dominated for the first 4800 feet of tool travel, nose wear becoming the decisive factor after that.

By increasing the feed the distance between the grooves in the end face of the tool is increased and a correspondingly greater groove depth is reached, causing greater work surface roughness. The length of path covered by the tool decreases with increasing feed and, consequently, the rate of nose wear decreases, leading to a smaller taper on the work.

Conversely, a decrease in feed is accompanied by shallower grooves in the tool with a smaller "wavelength" and leads to improved surface finish of the workpiece. The length of tool path, however, increases in inverse proportion to the feed and nose wear increases with the length of tool path. The increased nose wear leads to a greater taper on the work.

Taper becomes important when the workpiece is large since the length of path covered by the tool increases in proportion to the square of the linear dimensions of the piece when the feed is held constant. In the case of large workpieces a large feed should be chosen to avoid taper; for smaller pieces a small feed can be used. When a large number of small pieces is made, nose wear can be compensated for by readjustment of the tool between operations.

All the preceding work was done on free-machining steel (approx. B1112) with a steel cutting grade of carbide straight side cutting tool. The top side rake and clearance angles were 4 degrees, the end cutting edge angle, 4 degrees, the nose radius 0.02 inch. Nose wear and the formation of grooves was also found on electrolytic copper, carburizing steel (approx. C1015), machinery steel (C1045), nickel-chromium steel (4½% Ni; 1.2%Cr; .35%C) and pearlitic cast iron. In the finishing of free-machining brass no grooves are formed and nose wear is negligible.

Practical Applications

In the course of the work described a number of practical applications were made as follows:

1. Production of a predetermined surface roughness on several workpiece materials under shop conditions.
2. Determination of optimum end-cutting-edge angle for carbide finishing tools.
3. Testing of free machining steel for "finishability."
4. Testing of carbide for wear resistance.

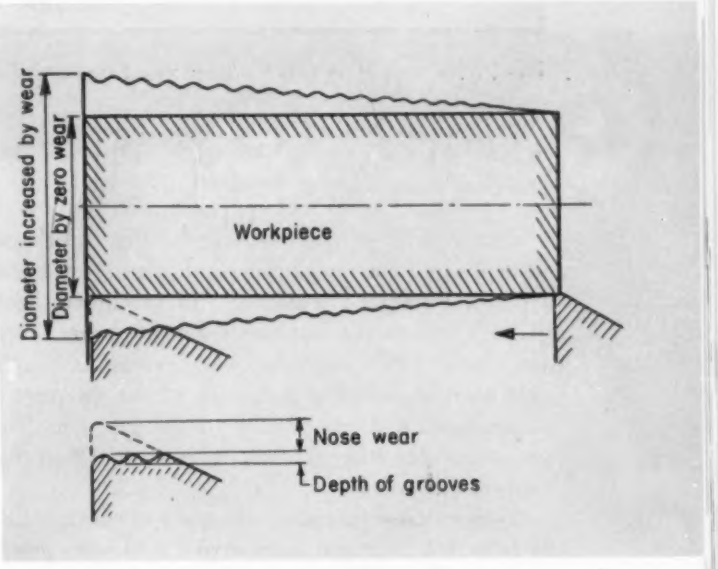
Fig. 7. (top right) Influence of formation of grooves and nose wear on workpiece diameter.

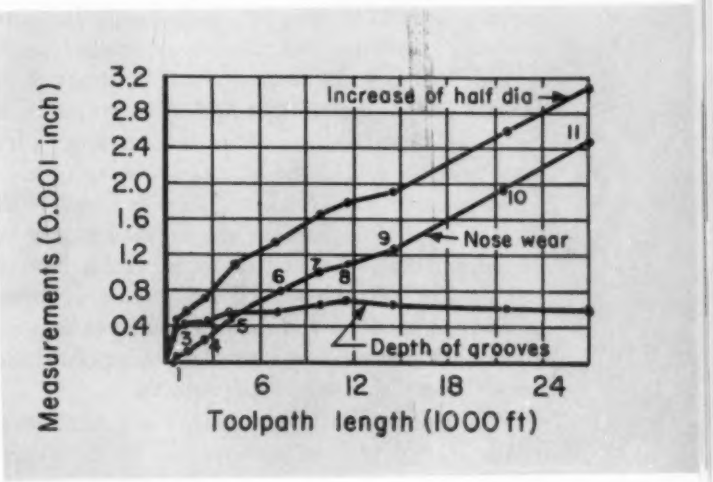
Fig. 8. (lower right) Influence of groove formation and nose wear on surface roughness and dimensional accuracy of the workpiece.

Predetermined Surface Roughness. Experiments were carried out to determine the conditions under which a predetermined surface condition can be produced on a number of workpiece materials. These tests were run on machinery steel (C1045), free-machining steel (B1112), pearlitic cast iron and free-machining brass. The goal set in all the experiments was the most economical production (largest feed) of surface with a roughness not exceeding $h_{avg} = 125$ microinches during a period of one hour.

The surface condition of the workpiece, a shaft of large dimensions, was measured at short intervals on a "Talysurf" surface analyzer.‡ This machine measures the surface roughness in microinches centerline average in contrast with the Schmalz microscope, used in the earlier experiments which gave the depth of the grooves on the tool in 0.001 mm units.

‡ The Talysurf instrument, made by Taylor-Hobson, England, electrically amplifies the movement of a diamond point giving a numerical reading of surface roughness similar to instruments used in this country, but in arithmetical average values of microinches.





...ize nose wear at 6000-foot intervals for the various

From these considerations the conclusion can be

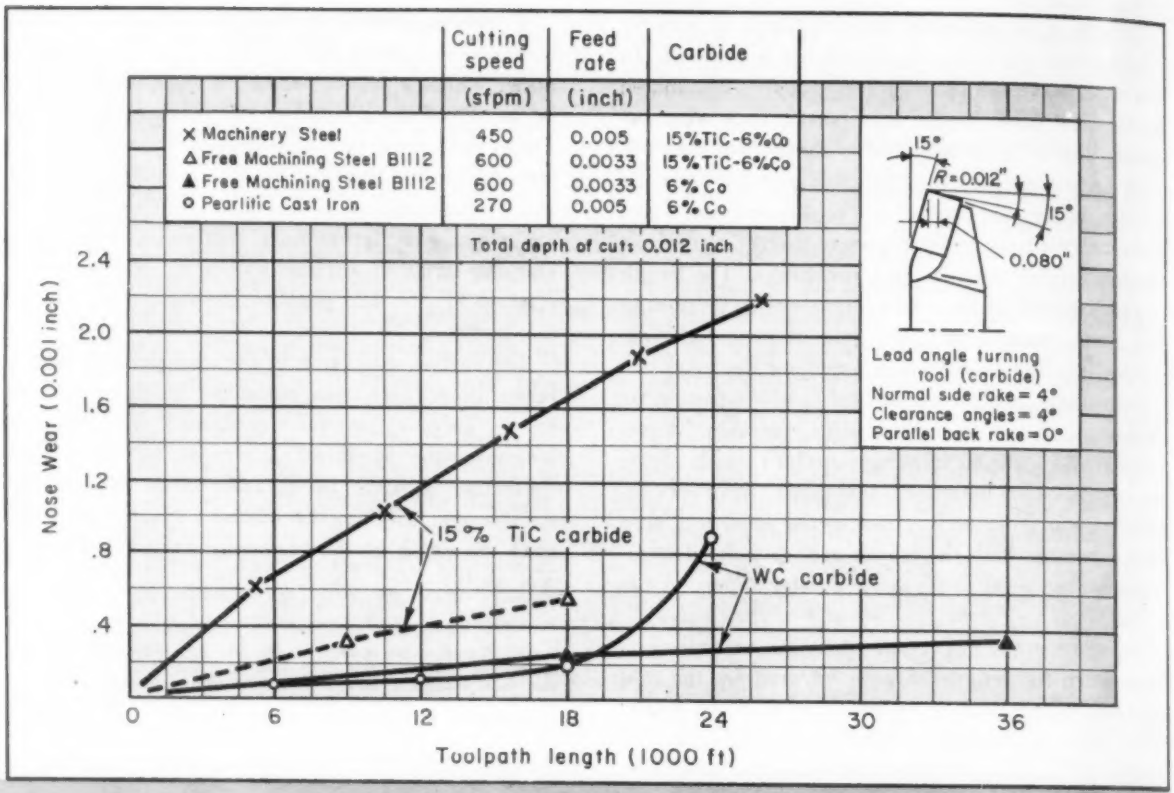


Fig. 9. Nose wear on carbide tools as a function of the tool path length for different metals.

Comparison of the records shows roughness develops in a manner that is characteristic for every type of workpiece material. On machinery steel (C1045), minimum and maximum roughness values are 30 and 125 microinches. An increase in roughness correlates with a deepening of the grooves; a decrease, with a smoothning of the grooves. The peaks between the grooves wear faster than the grooves themselves.

On free machining steel two types of carbide, i.e., at 15% TiC type and straight WC type were tried. The former produces a roughness that increases rapidly from 47 to 200 microinches while the latter produces a roughness that increases slowly from 64 to a maximum of 125 microinches. Contrary to the general belief, the straight WC type proves to be better for the production of finished surfaces on free machining steel than the titanium bearing type.

On pearlitic cast iron, roughness is erratic. The surface is pitted because the tool breaks material out of the surface. The surface finish varies between 130 to 150 microinches. When machining brass, grooves do not form and surface roughness does not exceed 110 microinches regardless of length of tool travel. These phenomena are striking.

Nose wear is illustrated in *Fig.* 9 as a function of length of tool path or tool travel. In the experiments under consideration, in which only one sample of each material was tested, free-machining steel and cast iron produce less wear than machinery steel. It appears that for finish turning free-machining steel, the straight WC carbide is superior to 15% TiC type regarding nose wear, *Fig.* 9, and surface condition. Nose wear on brass was too small to be detected by the available measuring equipment.

Optimum End-Cutting-Edge Angle: In finishing operations undesirable phenomena such as vibration and sparking will often bring about the end of tool life. Apart from nose wear these phenomena are affected to a high degree by the end-cutting-edge angle.

A 5-inch diameter shaft of medium-carbon steel 28 inches long was held in the chuck of a lathe and supported by a center. The shaft was turned with a lead-angle turning tool having an end-cutting-edge angle successively given the values of 2.5, 4, 6, 8, and 10 degrees at a cutting speed of 450 fpm with a depth of cut and feed of 0.012 and 0.005 inch, respectively. Nose wear was measured after every cut.

The tool path lengths at which vibration or sparking occurred were recorded. Results of these tests are shown in *Fig.* 10. The curves show the progres-



sive nose wear at 6000-foot intervals for the various end-cutting-edge angles, e.g., for an angle of 10 degrees the nose wear from 6,000 to 30,000 ft. is 0.0008, 0.0013, 0.0019, 0.0025, and 0.003 inch, respectively.

It appears from the graph that vibration may occur at end-cutting-edge angles smaller than 6 degrees and also at relatively small wear values or short tool paths of 6,000 feet or less. Sparking occurs from 4 to 10 degrees at large wear values and long tool path lengths of 21,000 to 30,000 feet.

For a reasonable tool life free of vibration the end-cutting-edge angle should not be smaller than 6 degrees. With angles larger than 6 degrees nose wear increases but sparking is delayed.

Wear Resistance: Wear on the end clearance face of the tool is dependent on the properties of the tool material as well as the workpiece material. In tests run on a single piece of machinery steel with different brands of carbide important variations in carbide quality were found.

Three brands of carbide (tungsten-titanium-carbide for general-purpose steel cutting) were used for finish turning a single shaft of machinery steel, two tools of each brand being tested in three locations within the carbide tip, viz:

1. Carbide blank superficially ground only;
2. Three faces ground, diminishing the original blank dimensions by 25 percent; and
3. Three faces ground, diminishing the original dimensions by 50 percent.

In this way the carbide tips were tested just below the surface, in the core and half-way between core and surface, in order to detect inhomogeneity that might possibly have been caused in pressing and sintering.

The cutting conditions used were a cutting speed of 450 fpm, a feed of 0.005 ipr, and a depth of 0.012 inch. Nose wear was measured at a tool path length of 8,400 ft for each tool for three locations in the carbide tips. Although properties vary between surface and core of a carbide plate, no systematic correlation can be made. The nose wear data clearly segregate into three bands representing the three brands of carbide. Quality is, of course, best at the lowest values of nose wear.

These investigations indicate that:

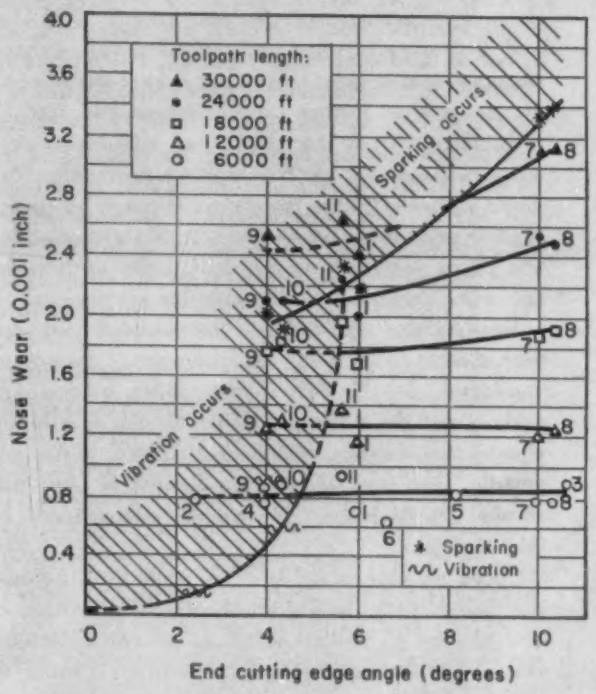
1. In finishing operations surface condition and dimensional accuracy are in many cases determined by formation of grooves and nose wear on the carbide tool.
2. Prevention of phenomena, caused directly by groove formation and nose wear, such as vibration and sparking should be the major considerations in the choice of the end-cutting-edge angle.
3. The quality of carbide can be determined by means of nose wear tests.

From these considerations the conclusion can be drawn that the formation of grooves and nose wear at the tool nose are the dominating factors in the field of finish turning with single-point carbide tools.

References

1. "Width of Wear and Tool Life in Turning"—Hans Joern Buermeister, *Werkstattstechnik und Maschinenbau*, Dec. 1950.
   "Cutting Tests with German and Foreign Carbides"—Maximiliam Lang, *Werkstatt und Betrieb*, Feb. 1950.
   "Modern Cutting Tools and Machine Tool Design"—C. Eatough, *The Institution of Mechanical Engineers*, Dec. 1948.
   "Trends in Modern Milling Machines"—A. O. Schmidt, THE TOOL ENGINEER, March 1949.
   "Some Factors Affecting Wear on Cemented Carbide Tools"—E. M. Trent, *Machinery* (Eng.) Nov. 8, 1951 and Nov. 15, 1951.
2. "Production of Quality Surfaces when Turning"—H. Opitz, *Berichte ueber Betriebswirtschaftliche Arbeiten*, Vol. 14 V.D.I. Verlag, Berlin 1940.
3. "Surface Measurement by Tracing the Profile"—A. Forster, Wetzlar, *Werkstattstechnik und Machinenbau*, Vol. 39, 1949, No. 6.

Fig. 10. Nose wear in finish turning as a function of the end-cutting-edge angle for various tool path lengths. The numbers indicate separate runs in which tool wear data were collected, the tool being reground between runs.





Direct reading spectrometers are most important laboratory tools for speeding analytical determination. As much as two hours' time per heat of steel can be saved by using these instruments. They indicate quantities of up to 24 elements in less than five minutes more accurately than can be done by wet methods.

Tool Steels Don't Just Happen

By David P. Hughes
Metallurgist, Latrobe Steel Co.
Latrobe, Pa.

HIGH-GRADE TOOL STEEL MANUFACTURE requires careful control of quality—perhaps the most rigid control to be found in the entire steel industry. While quality depends on many factors, the major one is chemical composition. It is easy to see why this is so. Many thousands of dollars in design and labor costs may be expended on an intricate die. If the steel has the wrong chemical composition, the die will be of little value in service.

In the modern Latrobe laboratory, constant temperature is maintained the year round. Humidity and dust are controlled and despite a huge exhaust system, the analytical laboratory is kept under slight air pressure to further prevent fumes and dust.

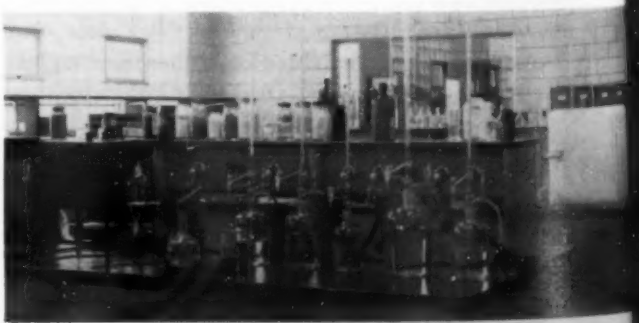
Samples of tool steel melts are withdrawn periodically from five electric melting production furnaces and sped to the laboratory through an underground pneumatic tube. The samples are annealed and chips are removed by drill, lathe or mill for analysis. Extremely brittle samples are crushed.

Samples are analyzed for the essential tool steel ingredients: tungsten, molybdenum, chromium, vanadium, cobalt, nickel, manganese, silicon and carbon, and the scavenger elements such as sulphur, phosphorus, copper, antimony, tin, lead, boron and arsenic. The most modern equipment is used, and results are flashed to the melting department by telautograph.

Speed as well as accuracy is important, because the melter wants to know the present condition of several tons of molten metal so he can determine what must be done with it. Accuracy cannot be slighted because one mistake can ruin ten tons of metal that might have a value of $20,000. Once the metal is poured, it is either right . . . . or scrap.

Direct reading spectrometers have lightened the analytical load in recent years because these instruments, with an electronic computer, give element amounts in true percentages. The spectrometer also immediately notes trace elements, the presence of which can cause disastrous defects in the steel.

Determining the composition of the melt is not the only function of the tool steel chemical laboratory. All incoming scrap must be checked, whether in carload lots or shipments of several pounds. A total number of 75-80 determinations are made before the melt, 45-50 during refining and one on the final ladle sample. All materials coming in are checked so that all finished products shipped adhere to the high quality demanded by the company itself and its varied customers.



Conventional wet methods of analysis are conducted in the main analytical laboratory. Huge volumes of intake and exhaust air are so carefully controlled in this space that a candle will burn without flickering.

Fig. 2. (upper left) Cross-section layout with de-

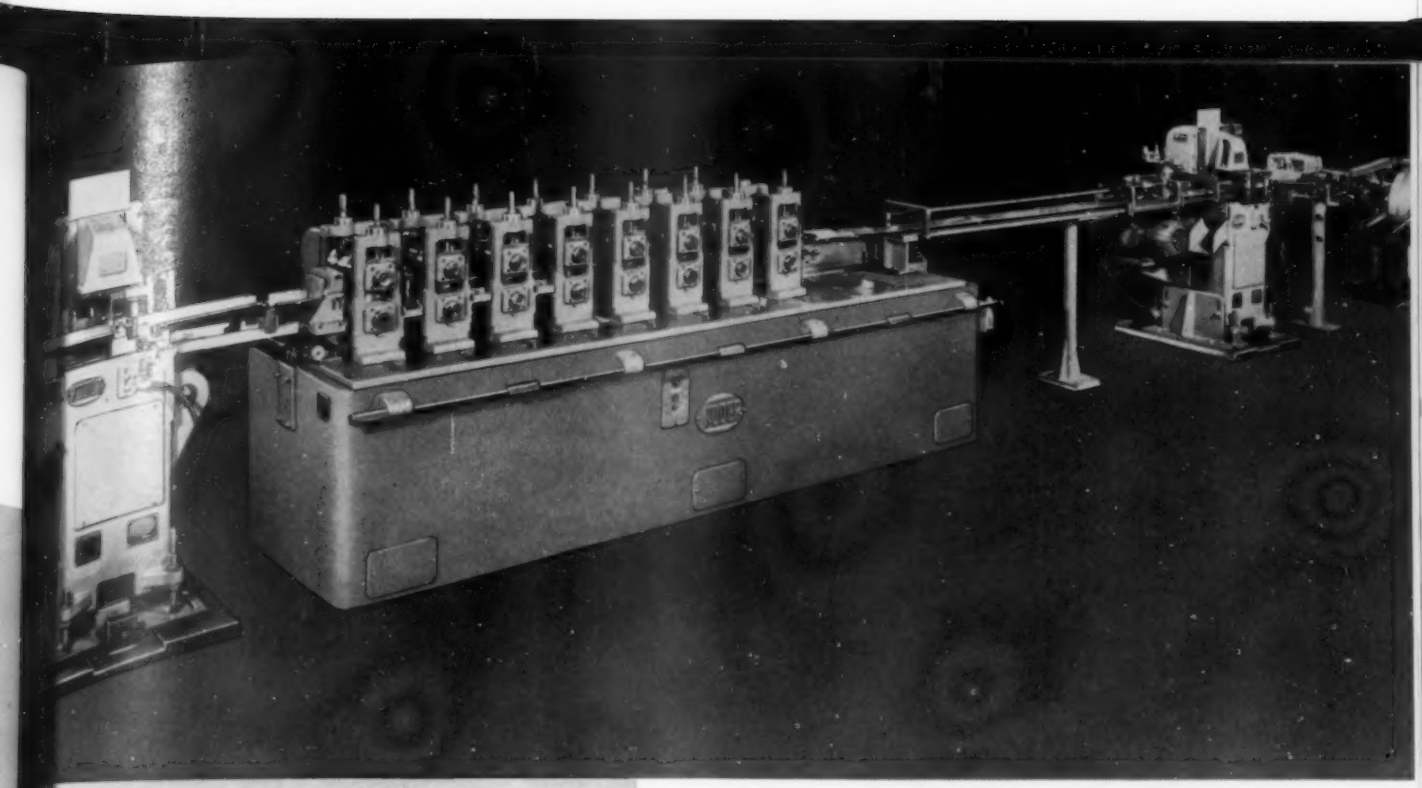


Fig. 1. Typical roll forming operation with a reel of strip at the right. The strip is straightened, formed in the rolling stand, put through a straightener and then cut to length with a flying shear.

ROLL FORMING

simple method for designing ROLLS

By Elmer J. Vanderploeg

Chief Engineer
The Yoder Co.
Cleveland, Ohio

ALTHOUGH THERE are several good methods for designing the tooling for cold roll forming of metal shapes, most of them require the use of special skills. For producing parts of uniform cross-section, this article will outline a procedure that requires only general knowledge of engineering and shop practice. To clearly illustrate the technique, a specific problem will be carried through from initial planning to fabrication and use of the rolls in a machine such as illustrated in *Fig.* 1. A slat for roller curtain doors, commonly used in warehouses and factories, is the part for which forming rolls will be designed.

Initial Planning

A cross-sectional drawing of the shape to be roll formed is furnished by the product designer. A layout of the cross-section is made from this drawing for the purpose of determining the width of strip necessary to produce the shape. Generally, this layout is made to a scale larger than full size.

On the layout drawing, the shape is divided into its component curve and straight sections. By using simple trigonometry, the developed width along the neutral axis is then calculated for each of the component parts. The strip width required for

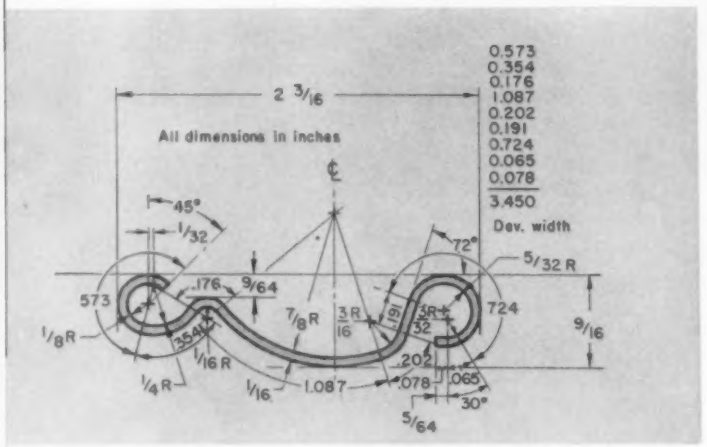


Fig. 2. (upper left) Cross-section layout with detailed dimensions of shape and calculated developed width.

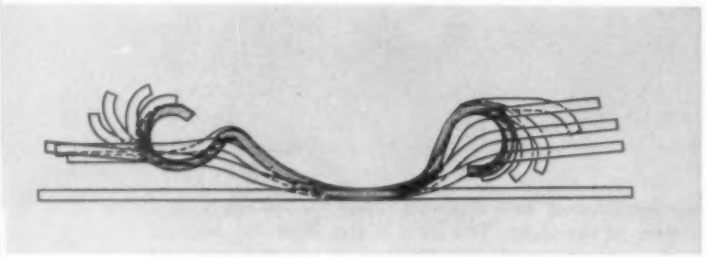


Fig. 3. (lower left) Superimposed stages of forming show the amount of change in cross-section from one stage to the next.

producing the shape is obtained by totalling these individual developed widths. *Fig.* 2 shows the layout and developed width of the roller curtain door slat.

With the shape and gage known and the width of the strip determined, it is next necessary to choose the proper size of machine. When selecting the size of machine for roll forming a shape, type of material, hardness of material, number of bends and over-all dimensions of the part must be considered in addition to shape, gage and width. To illustrate, a simple angle shape of 16-gage soft steel can be roll formed on a machine with one-inch diameter spindles as compared with a four-inch diameter spindle machine required to roll form a corrugated roofing sheet from 16-gage high-strength steel.

A machine with two and one-half inch diameter spindles is chosen for roll forming this slat shape because it will be in production over a long period of time and may possibly encounter extreme variations in gage and hardness of material. This slat has a greater number of bends than the average shape and these bends must be held to close tolerances because the two edges form a hinge when the pieces are assembled into a door.

To decide in what position a shape should be roll formed, a number of factors must be considered. A shape is usually positioned so that forming is in an upward direction. For example, a channel or angle is roll formed with the legs pointing upward. Deviations from this rule are sometimes necessary to enable other operational or handling problems to be more conveniently solved. Cutting off in a flying shear may require a certain roll forming position. Material with a highly polished surface on one side is better formed with the polished surface on top so that any blemishes or scratches on this surface can be quickly detected. The same is also true for prepainted material.

Since there are no problems of this type with this slat shape, it will be rolled in the position shown; one in which most of the forming is in an upward direction.

Roll Passes

There is no fixed formula or method for deter-

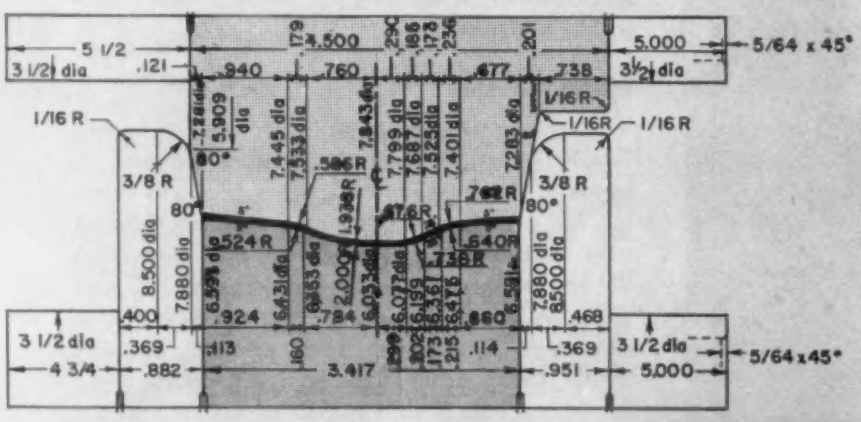


Fig. 4. Shaping rolls for first stage completely dimensioned for manufacture. Bottom rolls have tapered flanges made as separate pieces.

mining the number of roll passes or stages required to form a shape. This is best done by sketching the stages on a trial basis; superimposing each pass on the others in the sketch. Such a sketch is shown in *Fig.* 3 for the shape under consideration. This drawing shows the amount of changes in shape from one pass to the next and enables the designer to study and make changes to more equally distribute the amount of bending in each stage. The stages must be planned to give maximum contact between the metal being formed and the top and bottom rolls.

The amount of change of shape or contour in each stage must be restricted so the required bends can be formed without elongating the material. Too few stages can cause this trouble but too many stages will cause no production troubles and will add only to the initial cost of tooling. If there is any doubt about the number of stages required and if the machine available for the job has a sufficient number of spindles, it is advisable to add a stage to obtain trouble-free and economical operation. Planning of the stages is simplified by starting with the finished shape and unfolding it to the flat strip.

The **cover illustration** for this issue of THE TOOL ENGINEER represents a good example of roll forming and deserves a full explanation. The product is aluminum siding, used to replace wood siding on houses, produced at 80 feet per minute.

One of the rules mentioned in this article is violated in the production of this siding because another rule has priority. The material is formed with the painted side down because the majority of forming is upward only in this forming position.

The machine at the far end is a flying shear and cuts off the finished shape to the desired length without distortion at the cut. The scalloped piece at the top is the cutter or punch of the cut-off die. It is shown in the open position. The punch travels downward to pierce a slug from the shape.

The scalloped edge cuts the slug into several pieces for easier removal and to make a better cut. While the cut is being made, the entire die travels longitudinally with the stock.

Design of Rolls

When starting design of the rolls, a vertical center line is first established. This is the line that fixes the path of the metal as it passes through the rolls and is generally through the middle of the roll space on the spindles. In this case, with a 15-inch roll space, the center line is established 7½ inches from the flange, or stop, on the spindle which is on the right side of the drawings. The vertical center line of this shape is established on the center line of the ⅞-inch radius and shows clearly in *Fig.* 2. For convenience, the drawing line or pitch line of the rolls is established as a horizontal line at the bottom of this radius where it is intersected by the vertical center line. Along this line will be established the pitch diameters of the rolls.

To maintain a slight tension on the strip as it is being formed, the pitch diameter is stepped up 1/32-inch (0.031 inch) in each pass on the bottom rolls. The rolls are stepped up to maintain the correct ratio between top and bottom rolls. This ratio is 1.3:1, which is the gear ratio designed into this particular machine to permit deep shapes to be formed. The slat could have been formed on a machine with a gear ratio of 1:1 because of its

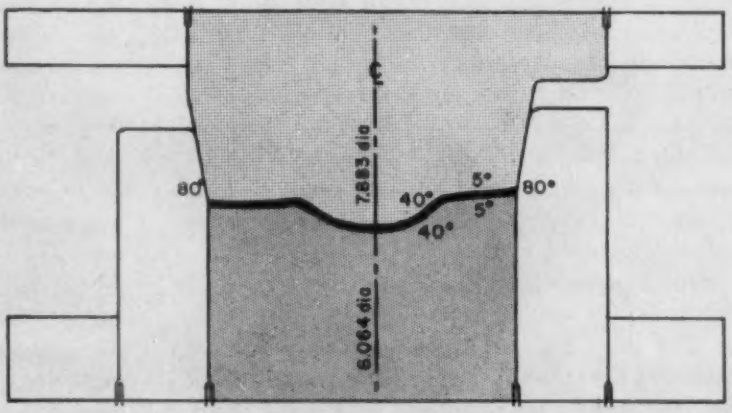


Fig. 5. Except for change in contour and step-up in roll diameter, rolls for the second stage are similar in design to preceding rolls.

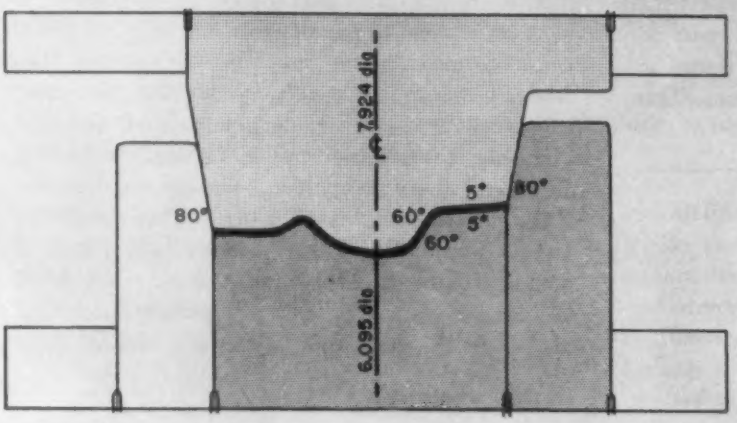


Fig. 6. Except for change in contour and step-up in diameter, rolls for the third stage are similar in design to both preceding roll passes.

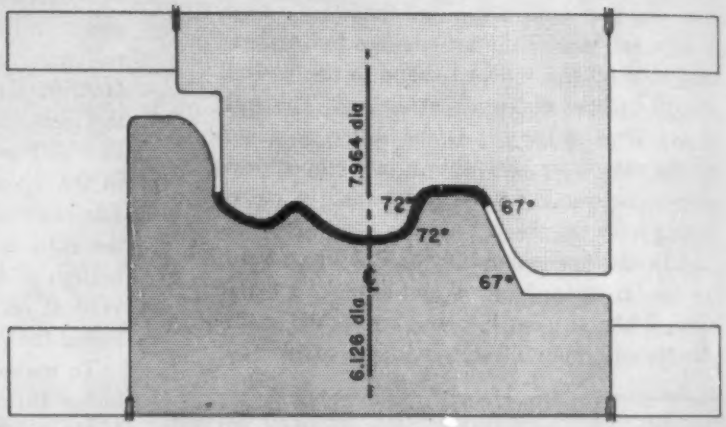


Fig. 7. At this stage the middle of the shape is finished to the final contour, and the curling of the sides is started.

shallow depth, but depth capacity of the machine for other shapes would have been sacrificed.

As the last roll pass diameter, *Fig.* 12, is generally used to calculate stock speeds, a roll diameter is established on it enough greater than the minimum for the machine to allow for redressing of the rolls to compensate for wear. In this instance, the minimum bottom roll diameter for the machine is 5 inches and the pitch diameter of this roll is taken as 6.250 inches, allowing $1\frac{1}{4}$ inches for redress on the rolls. The pitch diameter of the top roll for the last pass is 1.3 x 6.250 or 8.125 inches. Starting with this 6.250-inch bottom roll diameter on the last pass and stepping down $\frac{1}{32}$-inch on each preceding bottom roll, the pitch diameters for all of the rolls can be determined.

The design and detail drawings of the individual forming stages can now be completed. *Fig.* 4 shows the first stage with all dimensions necessary for machining the rolls to desired shape and size. Each piece mounted on the spindles is given a part number consisting of a number that identifies the entire set of tooling and a suffix that indicates the location of the part on the machine and on the spindle. Thus, the suffix 1T1 indicates the number 1 stage, top roll and first piece on the spindle.

Rolls are split into pieces primarily to save costly roll material. Such design also facilitates mounting rolls on the spindles and permits a limited amount of change or correction in the rolls if found necessary during test. Both the top and the bottom rolls are narrower than the space on the spindles and are centered on the spindles with spacers.

The spacers on the right, which is the flange end of the spindle, have width dimensions in decimals because the $7\frac{1}{2}$-inch dimension established from the flange on the spindle to the center line of the shape must be accurately held. The outside spacers shown on the left side need not be made to such an accurate width because they are backed up by a threaded nut. All spacers are made of machine steel or tubing, only the bore and width of which are machined.

Separated flanges are used on each side of the

bottom roll to position the metal over the rolls. They are separate from the main body of the roll to facilitate changing width of the bottom roll if this should be necessary. As shown in *Fig.* 4, these flanges are tapered 10 degrees from the vertical on the sides that contact the metal and have a large (⅜-inch) radius to guide the flat strip into this roll pass. The diameter of the flanges is such that the space between them at the outside is more than the width of the material as it enters the rolls. The material will then be guided by the flanges into correct forming position. Stages shown in *Figs.* 5 and 6 have flanges of the same design for the same purpose.

In all the roll passes, the forming flanges are on the bottom roll when the metal is formed upward and on the top roll when the metal is formed downward. *Fig.* 7 illustrates both conditions. Flange dimensions are easily calculated by trigonometry. A slide rule can be used quickly and with sufficient accuracy. All changes in contour of the rolls are dimensioned both for diameter and width, and all angles are given from the horizontal to avoid confusion.

When the middle of the shape has been formed to the final contour, *Fig.* 7, and the curling of the sides is started, both top and bottom rolls are made of one piece. It is no longer necessary to confine the edges of the strip. Flanges are at the right of the top roll and at the left of the bottom roll because they are needed to force the material down and up, respectively.

In the next stage, *Fig.* 8, the middle of the slat section remains the same but the edges are starting to be formed. The middle portions of all succeeding horizontal rolls will be the same because no further forming is required in this section of the shape.

The next stage, *Fig.* 9, uses a pair of rolls mounted on vertical spindles that are adjustable horizontally. These rolls are not driven, but are mounted on antifriction bearings so they rotate from the action of the shape being pulled through. Vertical rolls are necessary because the shape is being

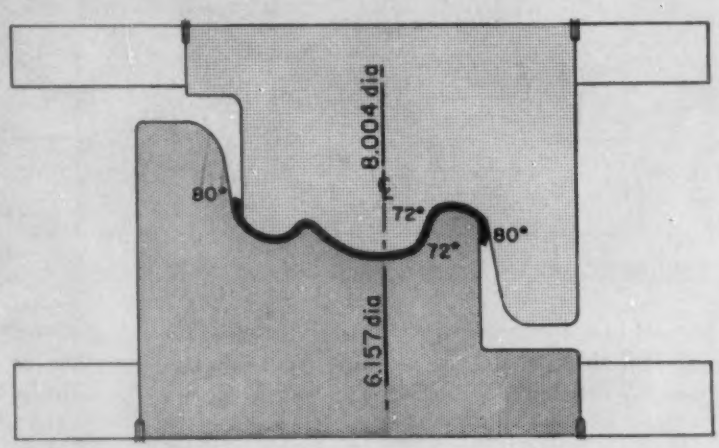


Fig. 8. In this pair of rolls, only the sides of the shape are formed. The middle of the shape was finished in the preceding roll pass.

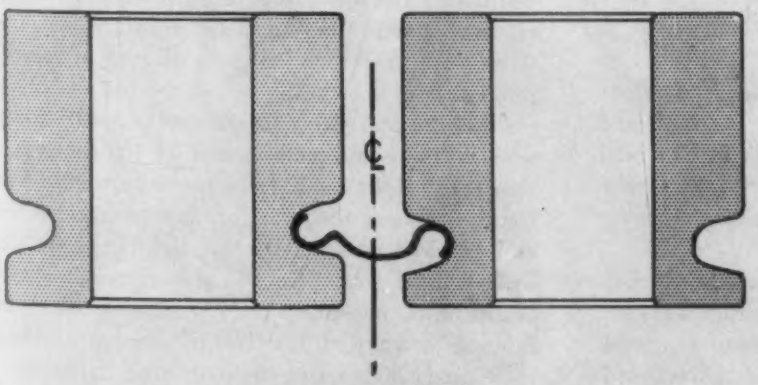


Fig. 9. At this stage, the direction of forming is horizontally inward from both sides instead of up and down as in preceding passes.

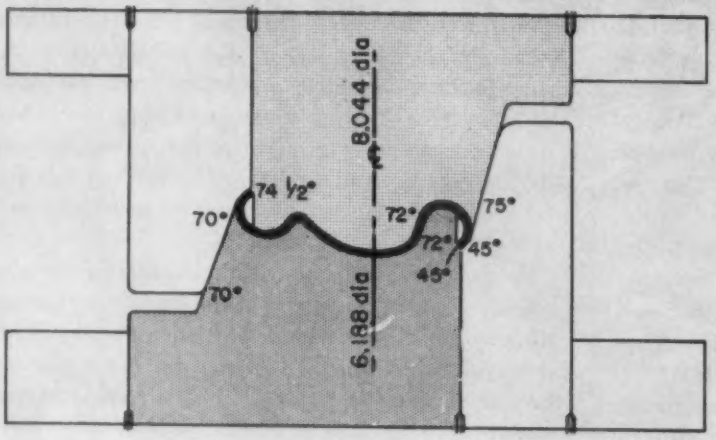


Fig. 10. The roll flanges in this stage are designed to lead the edges of the material into the rolls that are designed to accurately form the curls.

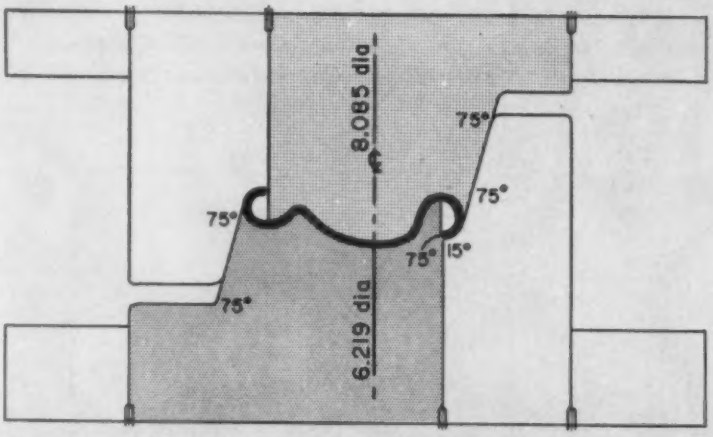


Fig. 11. These rolls, similar in design to the preceding pair, curl the edges of the material to almost the finished shape.

formed in a horizontal direction and, without these rolls, the shape would not enter the succeeding roll pass, *Fig.* 10, without scuffing on entering.

The first stage beyond the vertical rolls, *Fig.* 10, causes progression in shaping the sides of the strip. *Figs.* 11 and 12 are the rolls that complete the shape of the strip and are designed to surround the material as much as possible.

Roll Materials

The choice of material from which the rolls are manufactured depends largely on the gage of, and finish required on, the material being formed, and the total anticipated production of the shape. There is a large range of materials available for the manufacture of rolls.

For these rolls, a 0.70 carbon chrome-nickel-molybdenum electric furnace oil hardening steel was selected. It is available in a large range of stock sizes, both bar and forgings. It has good nondeforming characteristics, is easily machined and has good wearing qualities. This material is generally hardened to 60-63 Rockwell C except for thin or delicately shaped rolls which should be kept between 50-55 Rockwell C.

For shapes formed from unpickled hot rolled steel, high carbon-high chrome tool steel is used for rolls because of its resistance to abrasion. Its cost is considerably more than the tool steel used for the subject shape. When necessary to maintain a highly polished finish on a product, rolls are sometimes chrome plated. Chrome plated rolls are also used when forming prepainted material, such as venetian blind slats.

Cast iron and soft machine steel is used for rolls when forming thin material and for limited production runs. Rolls made from specially treated hard wood have been used for forming as much as several hundred thousand feet of light gage material without much wear. The life of hardened steel rolls is indefinite, depending on the care in use, often running to many million feet of shape production.

Necessity of grinding the tools after hardening is determined by the amount of deformation during hardening, accuracy of machining and dimensional

tolerances required by the product. In this case, the rolls will be ground after hardening because the flanges and roll surfaces run together and it is necessary to match top and bottom rolls closely. For some shapes, if the rolls are machined to a smooth finish, it is only necessary to polish and touch them up after hardening.

Mounting and Using Rolls

Before mounting rolls on the forming stand, each pair must be carefully matched on a surface plate to assure proper clearances for the metal passing between them. This careful checking saves considerable time in testing the rolls on the machine. The finished shape must come from the rolls reasonably straight and free from twist. Any extreme curving or twist indicates incorrect adjustments or matching of rolls, and must be corrected in the rolls for successful production of the shape.

Slight curving or twisting can be compensated for with a straightening device. This device can be either a roller or a guide type, whichever is best suited for the job. It must be adjustable vertically, horizontally and rotatably in order to produce a shape as nearly straight as possible, Also, it must be mounted as close as possible to the exit side of the last roll pass. *Fig.* 13 shows a simple but effective straightener guide for this shape. The mounting of this block can vary, depending on the machine it is mounted on, but must be universally and conveniently adjustable.

These rolls, when mounted and adjusted, will produce the shape with consistently uniform dimensions if the material fed into them is within gage limits and uniform is quality. If properly maintained and lubricated, they will produce millions of feet of this slat shape with but minor adjustment for normal wear.

After wear has become too great to produce a satisfactory shape, the rolls can be reground to the original contour on a reduced diameter and will again produce a shape equal to the original. A number of these regrinds can be made before the rolls become too small to produce the shape.

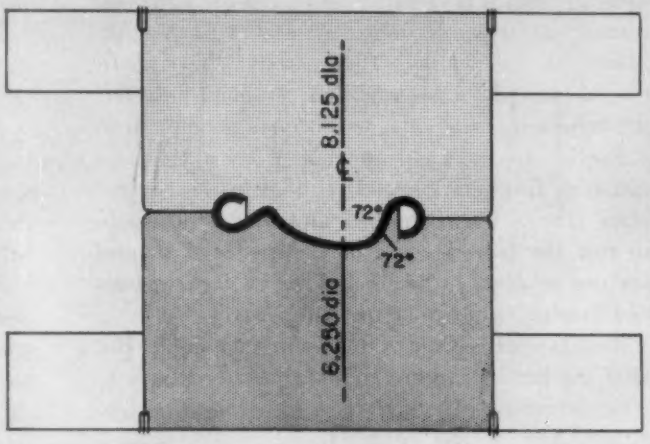


Fig. 12. This is the final forming pass designed to produce the finished shape.

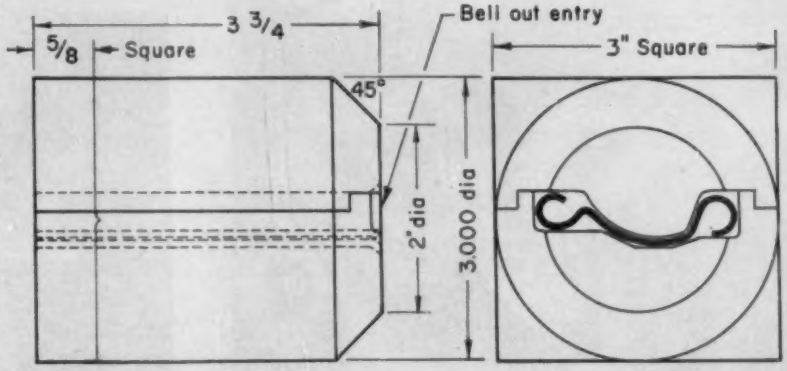


Fig. 13. This is a guide-type straightening device mounted immediately after the final forming pass to correct slight curving or twisting defects.

Starch Solves a Tooling Problem

By Robert S. Stanton

In an effort to step up production and reduce handling troubles, a method of fabricating mandrels for use in laminating contoured air ducts was recently developed by tool engineers at Boeing Airplane Co. in Seattle. The material they finally turned to as the answer to their problem falls into the believe-it-or-not category—it was potato starch.

Previously, it was common practice to make mandrels from casting plaster. Plastic-impregnated glass fabrics were wrapped around the mandrels, so that the fabrics could be stiffened and bonded for use as ducts by loading them in vacuum bags and heating in a low-temperature oven.

Results obtained up to this point were good. But after the laminates were cured, it was necessary to pound each duct with a hammer in order to break and remove the plaster mandrel on which it was produced, *Fig.* 1.

Fiberglas laminates are extremely tough and resilient, but repeated blows with a hammer can damage almost any thin-walled part. While the hammer blows did not ruin all of the parts, virtually all of the ducts required repairs after the mandrels were removed.

Research convinced the tool engineers that the best way to avoid these difficulties would be to fabricate mandrels which could be dissolved in water after serving their respective purposes, *Fig.* 2; further, that this could best be done by adding potato starch to a conventional mixture of casting plaster. Laboratory tests next disclosed that mandrels comprising one part potato starch and three parts plaster would have requisite heat resistance and water solubility.

However, during initial effort to use the starch-plaster materials it developed that, for some unknown reason, the mandrels became insoluble after they were used to produce ducts. Then one tool engineer happened to notice that a starch-plaster mandrel, following a normal cure cycle, was rather damp.

His suggestion of returning it to the oven to dry it out, proved to be the answers that solved the problem.

Somehow, the starch-plaster mandrels had been absorbing enough moisture from the laminating adhesives to become insoluble. But when they were dehydrated during a second baking interval, they became soluble again.

Since the dehydration idea was worked out, only one difficulty was experienced in using starch-plaster mandrels. That was due to the potato shortage last spring.

Fig. 1. Removing old type plaster mandrel. It is broken into pieces by pounding the plastic part with a rubber hammer.



Fig. 2. Dissolving potato-starch mandrel. Plaster in solution pours from a plastic duct which has been soaked in water of the correct temperature.

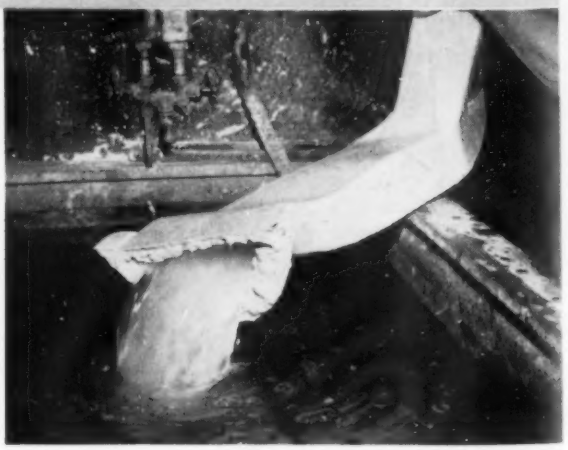




Fig. 1. Wire thread inserts to provide superior threads in all materials are available in a wide range of standard sizes and in two materials.

Wire Thread Inserts

design for production

By Paul E. Wolfe

Director of Project Engineering
Heli-Coil Corp.
Danbury, Conn.

THE ABILITY TO IMPROVE A PRODUCT, lower manufacturing costs, increase production or eliminate bottlenecks often hinges on finding fastening methods that are as advanced as modern materials and that match modern product performance specifications. As designers increase the use of light metals, plastics, alloys, laminates, etc., to try to meet more stringent design requirements and the need for more frequent disassembly of components, they often find that product weakness lies in threaded assemblies.

Insert Applications

For this reason, more manufacturers are turning to the use of screw thread inserts. These inserts, *Fig.* 1, precision formed screw thread bushings, coiled from diamond-shaped wire, provide standard size threads in all materials. The diamond cross-section, *Fig.* 2, accommodates internal and external threads simultaneously.

Tapped holes, lined with wire thread inserts can withstand higher loading torques and greater operating stresses than unprotected threads. Thread inserts also avoid stripping, seizing, galling, and

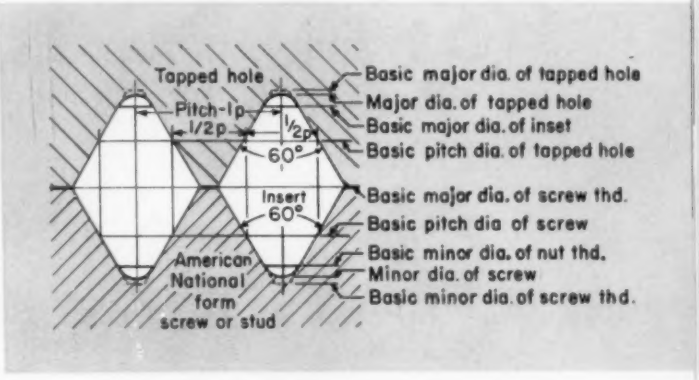


Fig. 2. Basic relationships of the wire thread insert and the external and internal mating threads are shown here.

corrosion; provide greater resistance to wear than unprotected threads, and permit substantial weight and space savings.

Higher Loading Strengths: Since they are flexible members, wire screw thread inserts automatically adapt themselves to the female receiving threads of the part and the male threads of the fastener. This flexibility compensates for angle and lead error between mating threads and provides increased thread flank engagement. As a result, wire thread inserts give a minimum of 25-percent greater loading strengths than unprotected tapped threads in the same material. However, depending upon materials and tolerances, increases in strength far beyond this can be achieved.

For example, recent tests on tapped holes versus insert protected holes in 24ST4 aluminum resulted in bolt breakage at 275 in.-lb with no insert damage while a bolt inserted in a standard hole tapped in the same piece broke at only 175 in.-lb after the tapped threads had begun to strip. Standard AN-approved ¼-28 bolts were used with 1-inch engagement for both tests.

Tests conducted by the manufacturer of a portable stapling machine indicate that insert lined holes safely withstand 25 to 30-percent higher loads than unprotected tapped holes. The machine is held stationary on a desk by rubber vacuum cups that are released by rocking the machine. Wire thread inserts provide uniform stress distribution over all engaged threads, thus avoiding high stress concentrations usually found in the first two or three threads of conventional assemblies.

Tapped holes in copper conductors and bus bars are being reinforced with wire thread inserts to eliminate stripping of copper threads, *Fig.* 3. Formerly, high installation torques exerted on cap screws caused threads in the unprotected copper to strip. Now, each set of copper transformer outlet plates has inserts in all tapped holes. As a result, the frequent interchange of induction blocks to meet different requirements no longer causes threads to strip. Also, the characteristics of the stainless steel wire and its surface finish have practically eliminated thread wear.

Space and Weight Reduction: Wire thread inserts permit weight reduction in two areas. They require less space than solid bushings or bolt and nut assemblies and they need no greater boss radius than standard thread assemblies. For example, a ½-inch diameter boss is used for either a ¼-inch standard tapped thread or a ¼-inch wire thread insert. Also, since the insert is formed of wire, it has no wall thickness and is therefore both

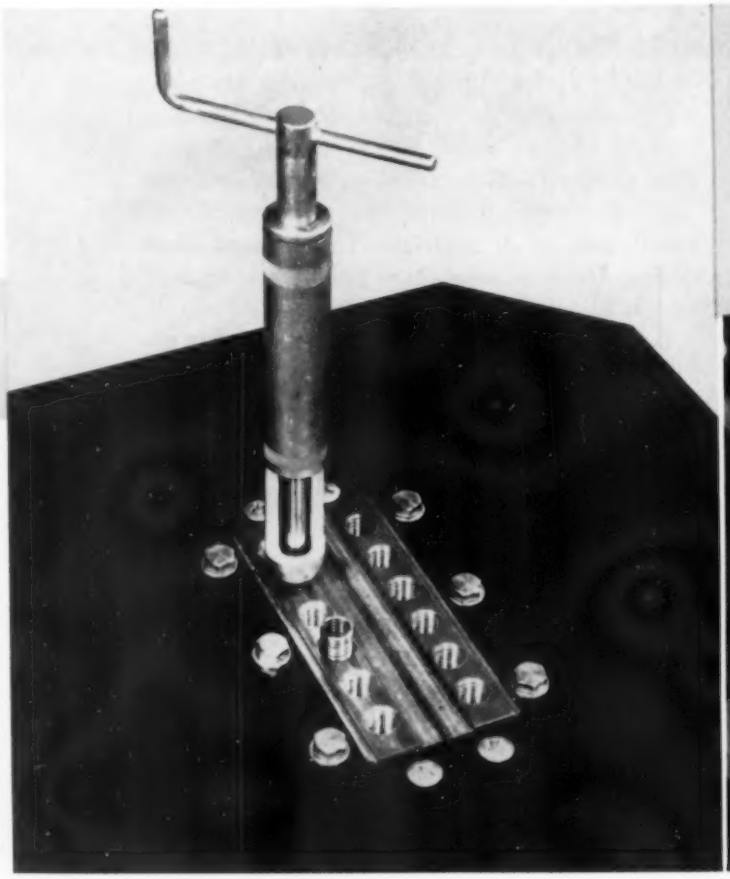
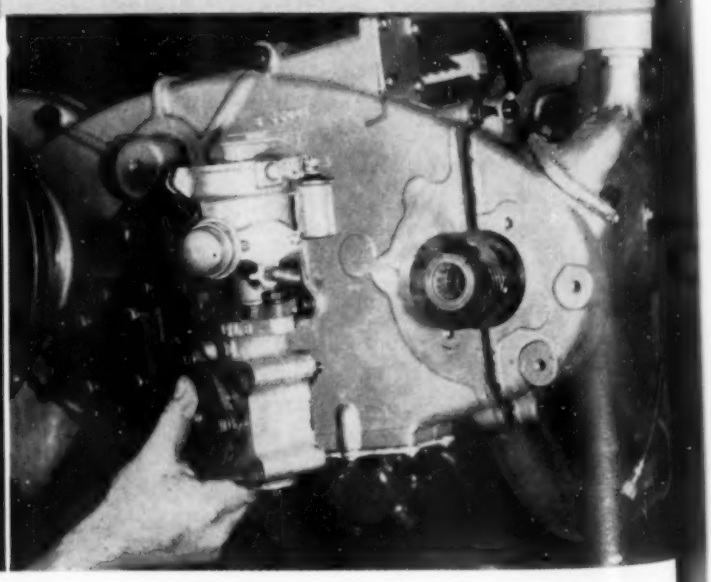


Fig. 3. (left) Stainless steel wire thread inserts reinforce the copper fishtails in a line of induction heating equipment. The inserting tool is a manual prewinding type.

Fig. 4. Wire thread inserts are used in all tapped holes in this industrial engine where inspection plates must be removed frequently.



lighter in weight and smaller in its external dimensions than a solid bushing for the same thread size.

Use of wire thread inserts permits a switch to lighter materials that could not be considered previously because of their low tapped thread strength values. For instance, manufacturers have changed from iron to aluminum, from steel to plastics and even from aluminum to magnesium to save weight.

Use of wire thread inserts reduced the weight of a fire pump 250 lb simply because the body could be changed from cast iron to aluminum. Until thread inserts were used, this change was not possible because of the relatively low thread strength inherent in aluminum. An experimental aluminum pump body had previously proved unsuccessful.

When the 70 tapped body holes were reinforced with inserts, the assembled housing safely withstood the required 800-psi hydrostatic test. The change to aluminum bodies effected a better than 40-percent reduction in weight—from 600 lb in cast iron to 350 lb in aluminum.

The aircraft industry has found many uses for inserts for space and weight savings in both airframes and engines. For instance, one military plane uses 389 inserts in its airframe to lighten weight and another uses 253. Jet engine makers are now using from two to three times as many thread inserts on current production as they did on earlier models.

Less Wear: Physical properties of wire thread insert materials make them practically immune to wear. Also, because they possess smooth, dense burnished thread surfaces rather than ground or machined surfaces, they cause less wear to mating male threads.

Metal is flowed in formation of insert threads rather than cut as in formation of standard tapped threads. Inserts are produced with a surface finish of 8 to 15 microinches. Wear on threads tapped in the base material is entirely avoided because these threads are used just once and are then protected by the liner. Stainless steel inserts have a hardness of 43-50 on the Rockwell C scale and a minimum tensile strength of 180,000 lb per square inch.

Wire thread inserts are being used to reduce wear and damage to threads in both assembly and reassembly operations where periodic removal of inspection plates poses a serious maintenance problem, *Fig.* 4. Field repair operations are simplified since threads are no longer damaged during inspection and servicing.

Temperature Resistance: Because of their inherent resistance to high temperatures, wire thread inserts provide protection against carburization. Standard stainless steel inserts can withstand temperatures up to 800 F without ill effects. Much higher temperatures can be met by special inserts made of metals such as Hastelloy C, Stellite, etc.

Wire thread inserts were designed into an induction furnace to eliminate a problem of seizing caused by exposure to heat, *Fig.* 5. In earlier models, attempts to remove cap screws used to join inductor units to hearth units failed after the furnace had been in use for a considerable period of time. Often, the screws were found to have seized in the threads because of the temperature encountered, with the result that they would twist off during removal.

To avoid this seizing, various classes of thread fit and even brass bolts were tried. Neither expedient produced any improvement. The next remedy tried was standard stainless steel thread inserts and since they proved successful they are now incorporated as original components.

Vibration Resistance: Some manufacturers use inserts to prevent thread wear caused by equipment vibration. Because thread inserts provide tighter fits, vibration between components and fasteners does not occur. Thread inserts are automatically self-locking in the female receiving threads of the hole because in the free state they are slightly larger than the hole and are therefore under compression after installation. Because the



Fig. 5. A small sleeve type inserting tool is used to place inserts on a large induction furnace. Inserts prevent seizure after exposure of the furnace parts to high heat and magnetic flux, reducing maintenance costs.

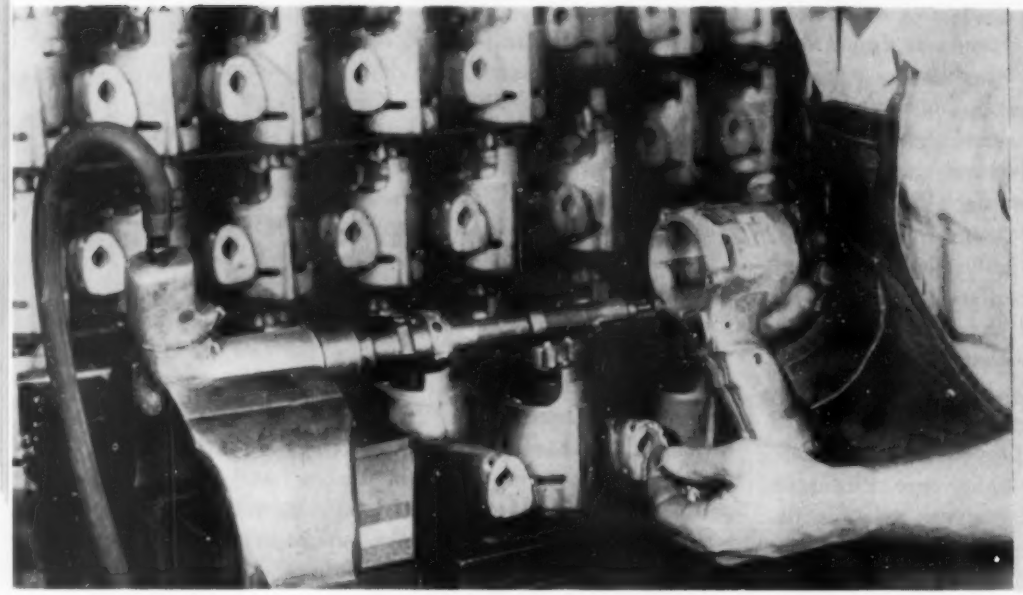


Fig. 6. A portable power inserting tool is used to position inserts in the body of an impact tool. The inserts prevent wear from vibrations.

stresses are more evenly distributed, more threads are in engagement when using inserts and more flank area is in contact. Vibration wear is thereby avoided.

Inserts are used for this reason in tapped holes in the housing of an impact tool. In early models of this tool, it was found that steel bolts, used to join aluminum housing sections, would often cause wear to the tapped aluminum threads because of the vibration induced by such operations as nut running, drilling, stud driving and masonry drilling.

Now, three sizes of thread inserts are used with lengths one and a half times the bolt diameter to give the desired holding strength without wear. Inserts are installed in a high-speed production setup, *Fig.* 6. Holes are drilled and tapped and then the inserts are installed with a power tool.

Special Applications: Industry has found many ingenious special uses for wire thread inserts that take advantage of one or more of the standard attributes plus others of a special nature.

One company, in addition to using wire thread inserts in a laminated phenolic block in one of its automatic arc-welding machines, *Fig.* 7—to provide threads that will not strip and that are impervious to wear—is also using them to provide a unique brake band type lock around a threaded bushing so repeated adjustments can be made without damage.

This block, a key component in the welding wire feed section of the unit must (a) prevent welding current in the continuous wire from grounding out through the supporting frame, (b) support the adjustable threaded bushing through which the continuous welding rod passes from supply reel to gun delivery tube and (c) provide a means for precise adjustment so that different sizes of rod can be accommodated. Each wire feed insulator block contains three wire inserts; two in holes holding set screws that bear on the third which is mounted in a large hole to provide the same protection and also act as a brake band around the threads of the adjustable bushing.

A change from one size welding wire to another requires loosening the set screws, inserting the correct size nylon sleeve in the wire feed bushing and readjustment of the bushing so the tip of the nylon supporting member is positioned close to the feed rolls to prevent the wire from buckling. When adjusted, the position is maintained by tightening the set screws that work against the outside of the larger insert.

Wire thread inserts are used in an aluminum aircraft lubricating pump, *Fig.* 8, to avoid the possibility of metallic chips entering the lubricating system. This use of wire thread inserts eliminates any risk of chips entering the pressure lubricating system when inlet and outlet fittings are screwed into the tapered pipe thread openings.

It was found that metal to metal contact between soft threads in the housing and the hard steel threads of the pipe fittings could result in minute chips breaking off the tapped aluminum threads. These metallic shreds, if carried through the system by the lubricating oil, could lodge under the by-pass valve mechanism and upset the pressure regulator, causing lubricating pressure to fall below the recommended value.

Now, two pipe thread inserts are used in each pump casting to provide desired thread protection. Surfaces of the inserts will not chip, the aluminum threads are protected and higher practical loading

strengths result in a more secure connection.

Insert Specifications

Wire thread inserts are made of AMS 7245-A stainless steel or AMS 7247-A phosphor bronze. When screwed into tapped holes, they form nominal size internal threads. Taps, gages, assembly tools and tang break-off tools are standard with the insert manufacturer. All sizes of wire thread inserts are precision manufactured to close tolerances and can be used interchangeably for any thread fit—Classes 3, 3B, 2 or 2B.

They are available in the following standard sizes and thread classifications: (a) 4-40 to 1½-6 sizes in National and Unified Coarse Thread Series, (b) 6-40 to 1½-12 in the National and Unified Fine Thread Series, (c) 10-1.0 mm to ⅞-18 in the Automotive Spark Plug Series, (d) 14-1.25 mm to 18-1.5 mm in the Aviation Spark Plug Series and (e) ⅛-27 to 1-11½ in the Pipe Thread Series.

Groups (a) and (b) are supplied in standard 1, 1½, 2, 2½, and 3-diameter lengths. For special applications, nonstandard lengths and sizes can be supplied. For instance, two engine manufacturers are using 6-⅞-18 thread inserts for securing steel cylinder liners to aluminum blocks in several new internal combustion engines.

When assembled in a specially tapped hole, the insert presents a permanent internal thread that conforms to National Bureau of Standards Handbook No. H28, "Screw Thread Standards for Federal Services," published in 1944, and its 1950 supplement.

When made of stainless steel, and with the work hardening produced during manufacturing, inserts are tougher than standard cap screw and stud materials. Phosphor bronze inserts are used with stainless steel fasteners and for electrical contacts.

All spark plug inserts are manufactured of stainless steel and are furnished with notched tangs. For spark plug applications, the tang is removed by rapidly bending it up and down with long nose pliers until it breaks off at the notch. Side motion might unseat the last coil or move the insert.

Inserts for use with automotive and aviation spark plugs are available with ends of coils and tangs either square or angular. Notches can be on the inside or the top face of the first coil.

If inserts for use with automotive spark plugs must be staked into aluminum, inserts with top coil lead serrated are available. Aviation spark plugs are available only with lead on top coil flat and serrated because assembled inserts must be offset and staked in place.

Insert Installation

In any class of fit, inserts permit simpler assembly than solid bushings because expensive operations such as milling, welding and countersinking are avoided. The class of fit of the final assembly depends on the tolerance to which the holes are tapped. Average mass production needs are best met by Class 2B, high quality mass production by Class 2 or 3B and highest degree of precision in interchangeable manufacture by Class 3.

Wire thread inserts can be installed in aluminum, magnesium, die cast metals, iron, steel, brass, copper, bronze, wood, plastics and other materials.

In all respects, drilling and tapping procedures for thread inserts follow general shop practice. The most important factors are maintaining specifications on diameters and depths. Specifications are available when it is necessary to maintain minimum blind hole depths or minimum through hole lengths.

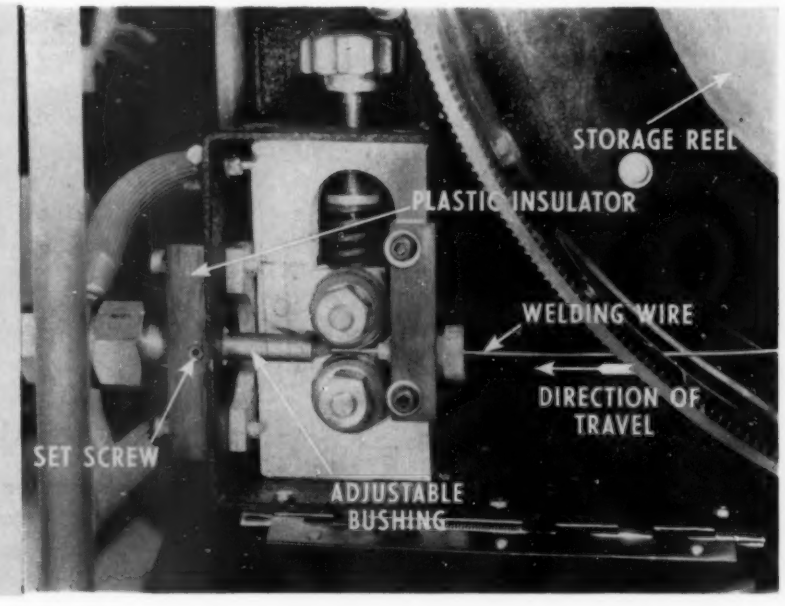


Fig. 7. Wire thread inserts act as brake bands around an adjustable wire feed bushing in an automatic arc welder. The plastic block serves as a structural member as well as electrical insulation.

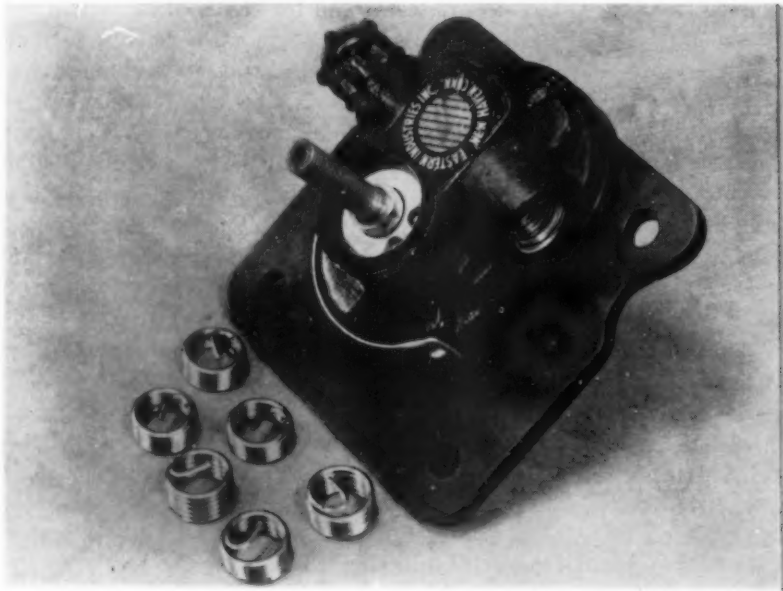


Fig. 8. By preventing threads from chipping when pipe fittings are installed in an aluminum pump body, wire thread inserts prevent metal particles from entering the lubricatng system of aircraft.

For all applications of screw thread inserts, they should be installed no closer to the surface of the part than ¼ pitch. If they are installed closer to the surface of the part, there is a possibility that the inserts could twist free of the hole during disassembly, which would defeat some of the functions of inserts. One purpose of the inserts is to reduce base part thread wear.

Whenever possible, 1 pitch is added to the minimum values of (1) the full tapped thread length, (2) drill depth excluding the point and (3) the tap depth including 3½ threads chamfer of the plug tap. Then the insert can be installed from ¼ to 1½ pitch below the surface. This facilitates production because the position limits are made broader.

Depths of counterbores or countersinks, if any, must be added to (2) and (3) above, and the maximum entering portion of the screw if the tang is not to be removed. When bottoming taps are used, drill depths (2) and tap depths (3) can be reduced by twice the pitch.

Thread engagement lengths to develop the full strength of the screw are shown in the accompanying table. These lengths, which agree with conventional engineering practice, insure strip proof threads even when sufficient wrench torque is applied to break the screw. This is because more threads are in proper engagement.

Lengths of Engagement for Through Holes

Material of Workpiece	Ult. Tensile Strength (psi)	Length in Diameters	
		Commercial Screws and Studs	*Aircraft Screws and Studs*
Wrought Aluminum	17,000 30 000 60,000	1½-2 1 -1½ 1	2 -2½ 1½-2 1 -1½
Cast Aluminum	20,000 32,000	1½-2 1 -1½	2 -2½ 1½-2
Cast Magnesium	34,000	1 -1½	1½-2
Forged Magnesium	50,000	1	1½-2
Cast Iron	——	1	1 -1½
Steel, Steel Forgings & Steel Castings	50,000 & up	1	1 -1½

Values in the table refer only to National and Unified Coarse Thread Series. In blind holes, the tang is not ordinarily removed. In such cases, unnotched inserts ½ diameter longer than shown in the table are used.

Boss diameters generally are the same as used for the American National Thread Series, with dimensions depending on the thread size and physical properties of the boss and mating screw materials.

Tapping: Before tapping, the standard diameter hole should be countersunk (120-degree included angle) to major diameter within shop practice tolerances.

Tapping is usually done in a single operation with one of four types of finishing taps (a) plug, (b) bottoming, *Fig.* 9, (c) spiral pointed plug and (d) spiral pointed bottoming. Roughing taps are available for occasions when difficult tolerances or tough materials make both rough and finish cuts necessary.

Gaging: Special thread plug gages that match the taps for the class of fit are used to check tapped holes before installation of the inserts. There is a gage for each size insert in each class of fit.

Installation: Inserts are installed by applying torque to a diametral tang, which may or may not be notched for respective application in through or blind holes. Installation can be done with hand

or power tools depending on the production rate.

Two types of hand inserting tools are available. A prewinder type, *Fig.* 3, is a precision tool that aligns and precompresses the insert for easy installation. A slotted mandrel in the tool drives the insert by its tang. This tool is recommended for hand installation of all Fine Series inserts, and for small quantity production work in the Coarse Series up to and including the ¾-10 size.

For hand installation of larger sizes in the Coarse Series a sleeve type tool is recommended. The sleeve type is also available for most other sizes in the Coarse Series and is ideal for occasional use. It consists of a plain sleeve by which the insert is pressed against the mouth of the hole and a slotted mandrel for driving the insert.

Power installation is recommended for all high volume production. A slotted mandrel in a power operated attachment automatically engages the insert tang and drives the insert to the proper depth below the surface. These attachments also prewind the insert.

They can be driven by a drill press or electric and pneumatic portable tools having speeds of 500 rpm or less. The portable tool may be used by hand or mounted in a drill stand or special fixture.

Removing the Tang: Each insert is made with a tang—a portion of the bottom coil that is offset to provide a simple driving member. This tang is left on the insert after installing except when tang removal is necessary for screw clearance or product appearance.

If tangs must be removed, notched tanged inserts are used. The notch, located at the root of the tang, provides a clean break-off point after installation that creates no interference to the screw or stud. If tang break-off is not required, unnotched inserts are used because they are less expensive, and save the costs of tang removal operations and tools.

Removal of the tang in through-holes is accomplished by either manual or automatic tang break-off tools. For occasional use, the manual tool is recommended. It is a simple punch device made of tool steel and is placed in the insert so that it rests against the tang. A sharp hammer blow on the top of the punch breaks off the tang cleanly at the notch without disturbing the rest of the insert. For high production, an automatic tool is used. This tool contains a built-in punch driving mechanism and requires only one hand to operate.

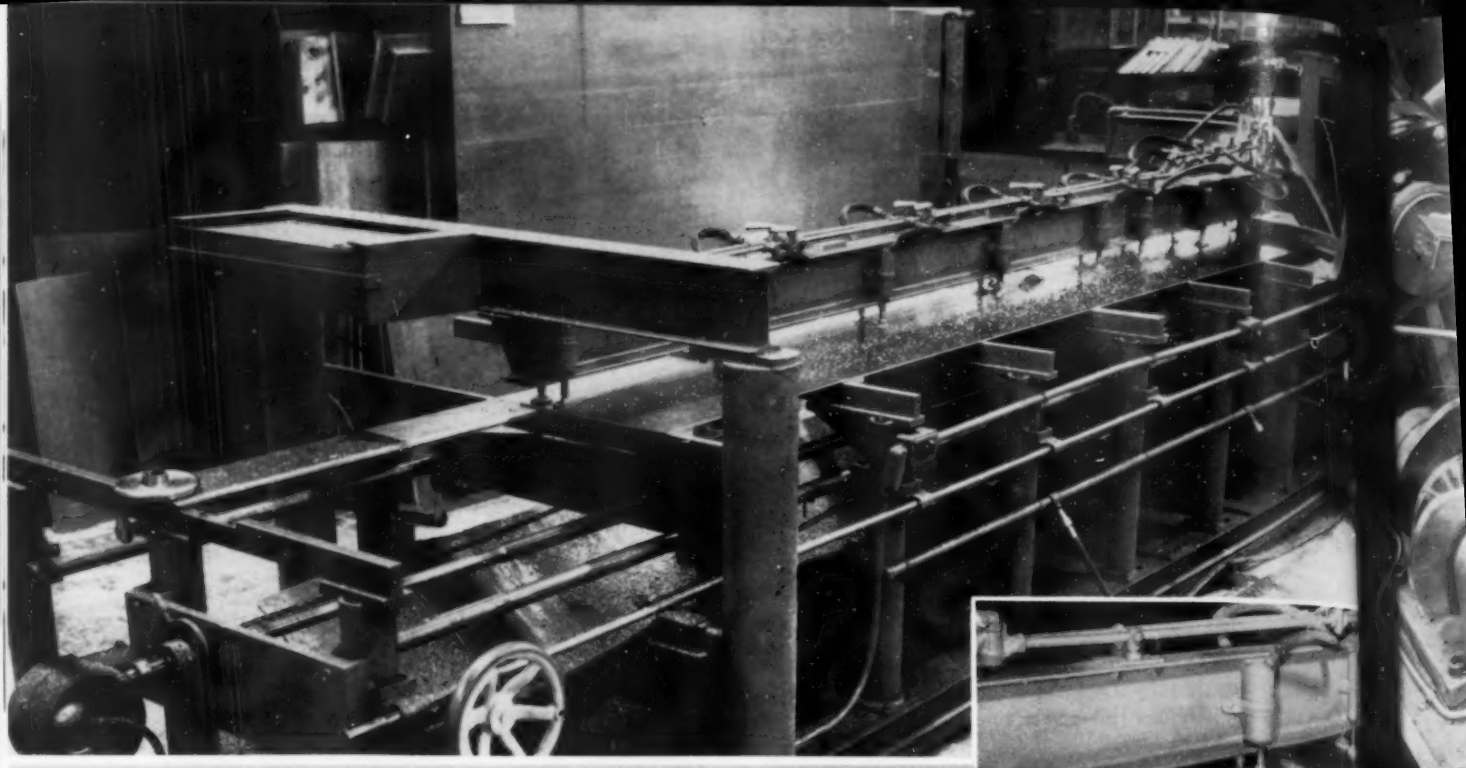
Extracting Inserts: Sometimes inserts are erroneously installed too deep, cross-threaded or otherwise improperly inserted. Such inserts are readily removed with extracting tools that are available in four sizes to fit all sizes of inserts. Even inserts that have been installed below a counterbore or other recess can be removed by slight modification of the standard extracting tool.

Production Salvage: Wire thread inserts are not only useful as original components. They serve a real purpose in production salvage where they are not originally specified. Should a thread tapped in a part to directly receive a fastener be damaged during production, the thread can be drilled out, the hole tapped and an insert put in that will achieve the same class fit and take the original fastener specified.

Though this is an expedient, the inserts are practically invisible, the threads are stronger than the original ones, and valuable production time and materials are not lost.



Fig. 9. A bottoming style plug tap is used to form the threads in the pump of *Fig.* 8 prior to insertion of the thread insert.



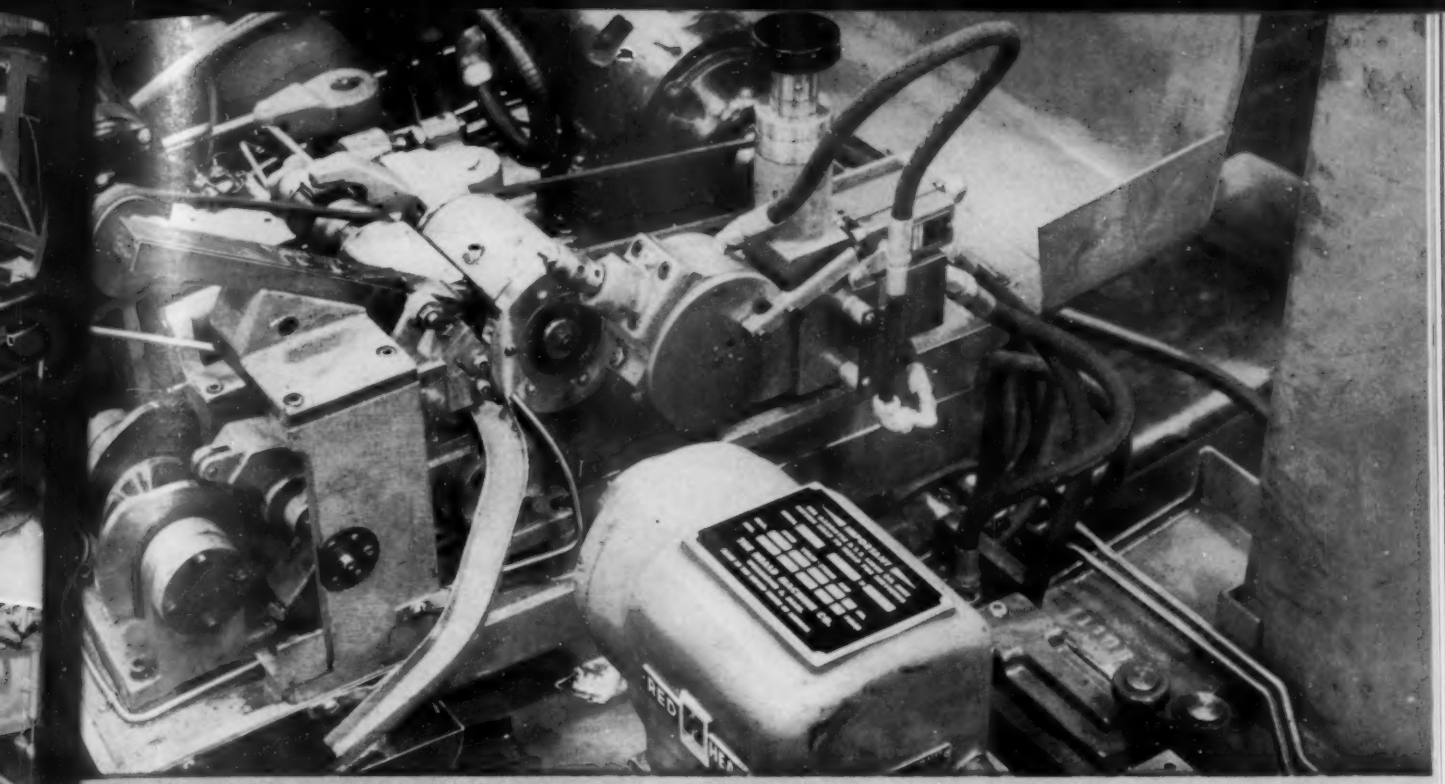
SPECIAL PLATE SAW, inexpensively designed by the tool engineering department of Grumman Aircraft, incorporates standard jig and fixture components. An unusual feature is the feed arrangement in which a movable carriage is used to mount the saw, the work remaining fixed. Details of the hold-down and saw carriage features are shown in the accompanying close-up. Pneumatic clamping holds the work on the table. The saw blades are carbide tipped, 12, 40 or 60 points. Up to one-inch thick aluminum can be handled with an accuracy of 0.010 inch, and the stock can be as long as 12 feet. Cutting oil is applied with a vapor feed.

TOOLS at work



MILLED SIMULTANEOUSLY in this special setup, three radial surfaces of an adjustment nut are cut at a speed of 70 fpm and a feed of 5¼ ipm. The part is a 300 Bhn alloy steel forging. The rotary table is mounted upon a 15 hp vertical milling machine using high-speed steel cutters, one side of the part is milled with the longitudinal feed. After indexing, the radii are cut. Then the rotary table stops and the remaining straight surfaces are finished by the longitudinal feed of the main table.

—Photo courtesy Kearney and Trecker Corp.

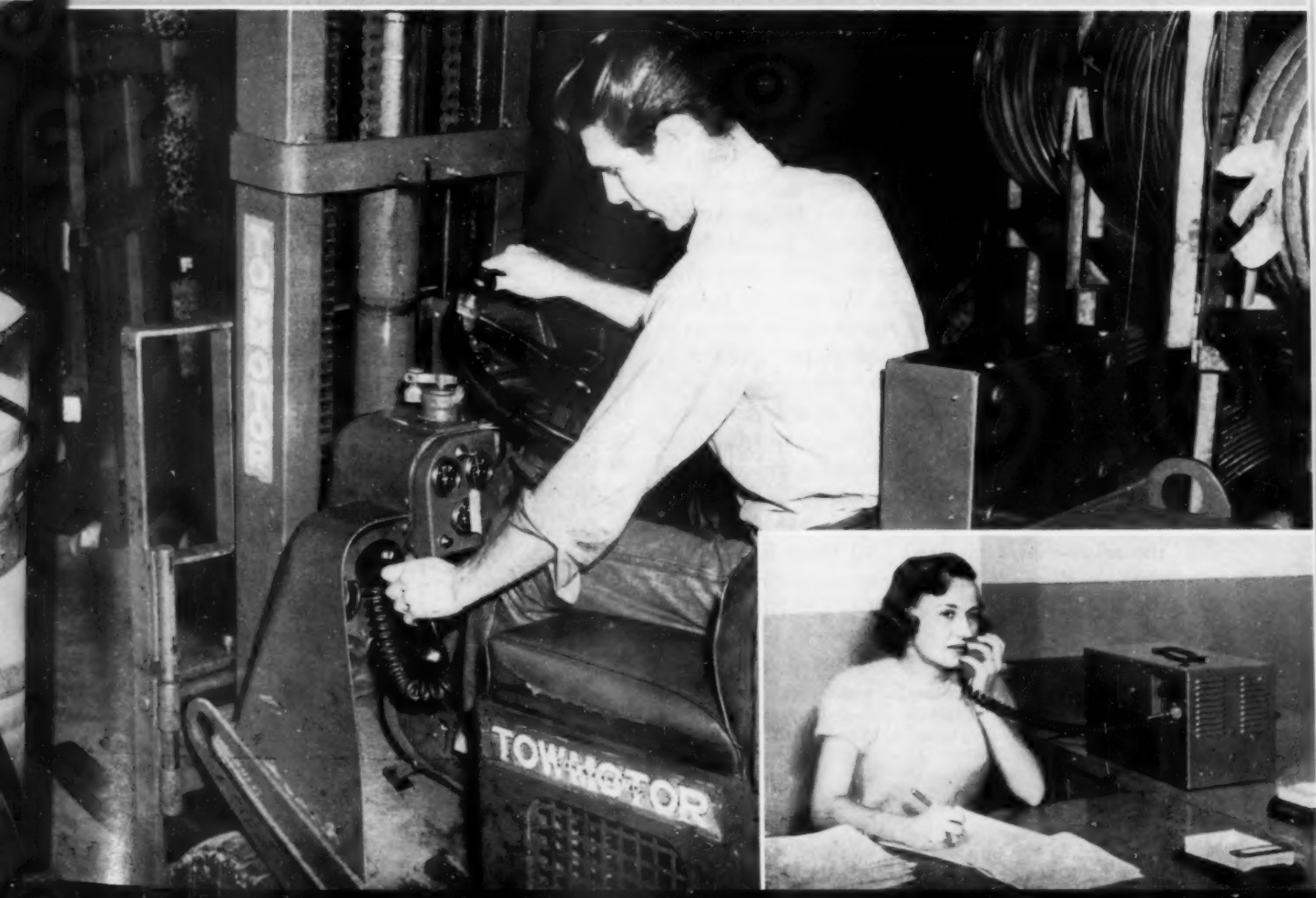


AUTOMATIC GRINDING operation on the inner race of miniature ball bearings uses a tangential contact, rotating workholding device. The operator merely loads the feed chute with the part which is 0.241 inch in diameter. The machine grinds the bore to a tolerance of 0.0002 inch and automatically ejects the finished part. Production is 150 pieces per hour. Wheelhead is driven by a high-frequency water-cooled motor running at approximately 60,000 rpm.

—Photo courtesy The Heald Machine Co.

TWO-WAY MOBILE RADIO equipment for fork trucks expedite materials handling operations at Standard Pressed Steel Co. Five trucks now do the work of six. As the driver completes delivery of one job, he receives instructions from the dispatcher in production control regarding his next assignment. A truck can be secured in five minutes for a rush job whereas it formerly took up to half an hour to contact the truck operator.

—Photo courtesy RCA



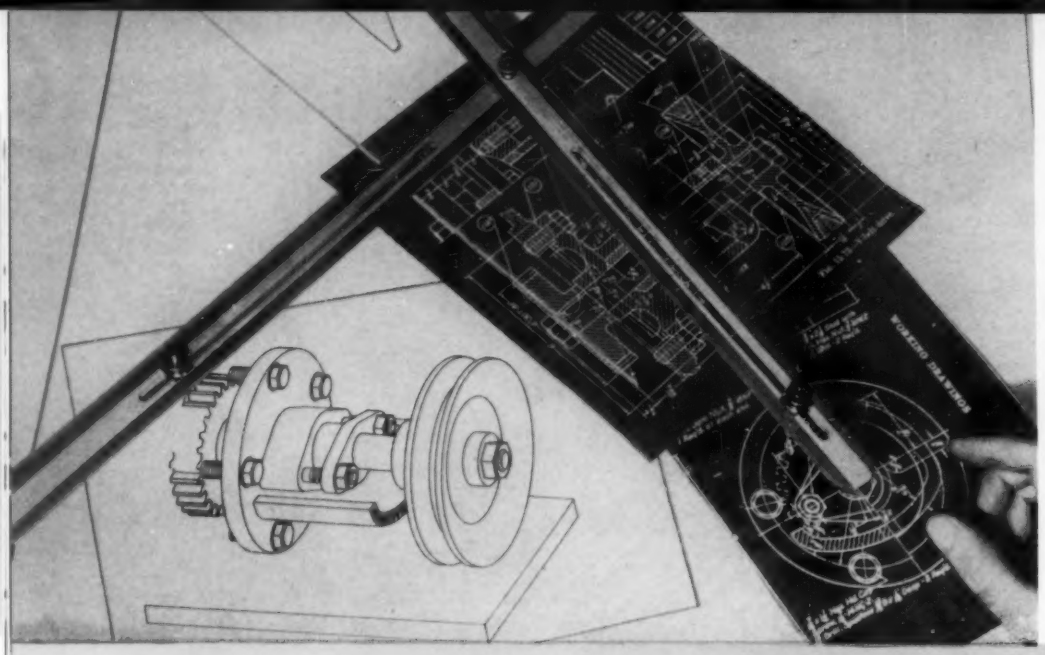


Fig. 1. A trimetric drawing of a gear is traced from a blueprint by means of a new drafting machine which utilizes axonometric principles of projection.

Pictorial Drawings Prepared from Conventional Views

INDUSTRIAL USE OF PICTORIAL DRAWING has been hampered by the difficulty of making such representations. Along with this there is a general lack of understanding of axonometric projection upon which most pictorial drawing in industry is based.

A drafting machine has now become available which provides a direct link between conventional and pictorial drawings. Called the Adapto-Arm by its producer, The Wilkinson Co. of Arnold, Maryland, the device traces from the three views of an engineering drawing, *Fig.* 1. The machine is based on the mathematical relationship of the three principal planes of axonometric projection and can be used for isometric, dimetric or trimetric drawings.

Actually the classifications of isometric, dimetric and trimetric drawings are of little value in understanding this type of projection. A cube situated so that none of its planes is parallel to the picture plane, *Fig.* 2, can be conveniently used to explore the relationships involved. All three faces of the cube are shown in this axonometric projection. The three coordinate axes $\overline{AP}$, $\overline{BP}$, and $\overline{CP}$ represent three mutually perpendicular planes. In the drawing the relation of any one of the three axes to the plane determined by the other two axes is of prime importance. The graphic solution of axonometric projection deals with this relation.

As represented in the drawings, one of the axes, *AP*, is vertical to agree with the fundamental of balance. The plane formed by the other two is horizontal. While theoretically the angles *APC* and *APB* can be drawn any size between 90 and 180 degrees, for convenience *APC* is taken as 120 degrees and APB as 105 degrees.

The mathematical principles upon which the ma-

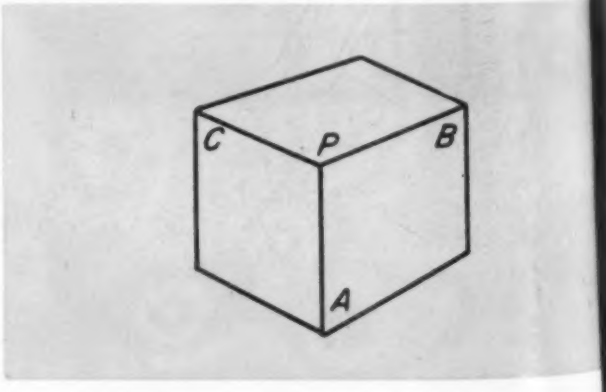


Fig. 2. This cube is a simple axonometric projection. By definition the object is situated so that none of the three principal planes is parallel to the picture plane.

chine is based can best be understood after a graphical analysis of one corner of the cube, *Fig.* 3. The first step is to extend $\overline{AP}$. At any point X on $\overline{AP}$ extended, a perpendicular is erected intersecting $\overline{BP}$ and $\overline{CP}$, at Y and Z. The right angle $ZP'Y$ is constructed so that the corner P' falls on $\overline{AP}$ extended. With $\overline{YZ}$ as an axis, triangle YPZ has now been revolved into its normal orthographic view $YP'Z$. Lines $\overline{YP'}$ and $\overline{P'Z}$ are the true lengths of $\overline{YP}$ and $\overline{PZ}$ respectively. Similarly the $\overline{CP}$ axis may be extended and by the same method plane $\overline{AB}$ revolved into its normal orthographic view. The $\overline{BP}$ axis is similarly extended and plane $\overline{AC}$ revolved.

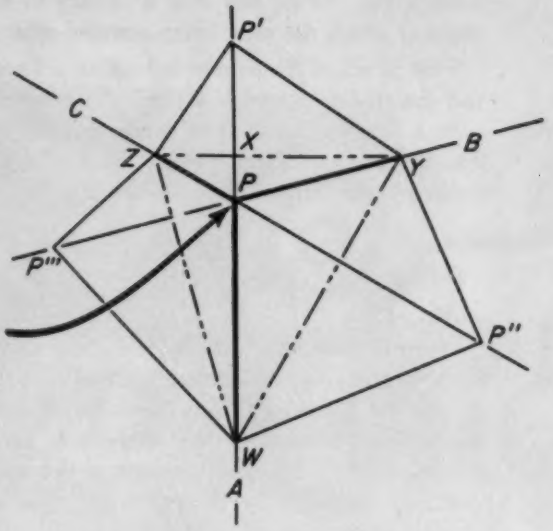


Fig. 3. In this view of one corner of a cube, the original planes have been revolved around the phantom lines to show relationship of orthographic views to the pictorial view.

Shapes Cut Out

To better study the axonometric drawing of this corner of the cube in relation to the actual corner, the shape $ZP'YP''\ WP'''Z$ may be cut out. The reference lines $\overline{ZY}$, $\overline{YW}$, $\overline{WZ}$ are used as fold lines for the three normal orthographic triangles $ZP'Y$, $YP'W$ and ZWP'''. When folded so matching edges meet, the three mutually perpendicular planes originally drawn in *Fig.* 2 are formed. Many properties of axonometric projection now become clear.

First, line $\overline{ZY}$ on plane ZPY is shown in its true length. Any line on the plane ZPY parallel to $\overline{ZY}$ will project in its true length, and is called a major axis of the plane. Thus, in axonometric projection a major axis on a plane lies at right angles to the line perpendicular to that plane.

Secondly, $\overline{PX}$ or any line on the plane ZPY that is parallel to $\overline{PX}$ will be reduced greater than any other line than can be drawn on the plane ZPY. This line, $\overline{PX}$, is called a minor axis of the plane ZPY. Thus, in axonometric projection a minor axis of a plane lies on or parallel to a line perpendicular to the plane. The reduction of a plane is measured by its minor axes.

The vital trigonometric relationship between a plane and a line perpendicular to that plane follows: A line in axonometric projection forms an angle with the picture plane. The cosine of this angle is the coefficient of reduction of the line. The sine of the angle is the coefficient of reduction of the plane.

The angle is called the angle of slant and is applied to both the plane and the line perpendicular to the plane. One other property is angle of position. In the figure, angle $P'YX$ is the true angle of position of $\overline{BP}$ in the *B-C* plane. These are reciprocal angles which show the position of the right angle $ZP'Y$ in the *B-C* plane.

The arms of the pictorial drafting machine function as the geometric expression of the basic principles of axonometric projection. Through a system of links each coefficient of reduction is accurately solved. In use the tracer and marker, *Fig.* 4, express the sine movement while the scanner expresses the cosine movement. In other words, the tracer and marker draw a plane while the scanner draws a line perpendicular to that plane as illustrated.

Tracer and Marker Used

If the tracer is moved in a direction parallel to the channel track, a major axis will be recorded by the marker. The tracer and the marker can move straight up and down without changing the aspect of the two links with each other, covering the same amount of line. This is understandable since there is no reduction involved in a major axis.

If, however, the tracer moves in a direction at right angles to the channel track, a minor axis is recorded by the marker. This action causes the links to open and close like an umbrella. The distance from pivot to tracer and from pivot to marker is the same, *D*, *Fig.* 4. The distance from pivot to runner is 24-inches. So it can be seen that the minor axis (coefficient or reduction) will be equal to 24 minus *D*, divided by 24 plus *D*. This, then, would equal the sine of the angle of slant. To solve for *D*, let *E* equal the minor axis:

$$D = \frac{(E + 24) - 24}{-1 - E}$$

This formula may be used to adjust the arms to any axonometric drawing system. Once the adjustment is made to the sine of a specific angle, the scanner must be set to produce the cosine of the

same angle. To do this it is necessary to find the angle at which the view being scanned must be set.

First of all, if the pointer is held on a fixed point and the tracing board is moved along the straight edge a line is drawn. For every unit of measure that the tracing board moves, the line draws according to the formula:

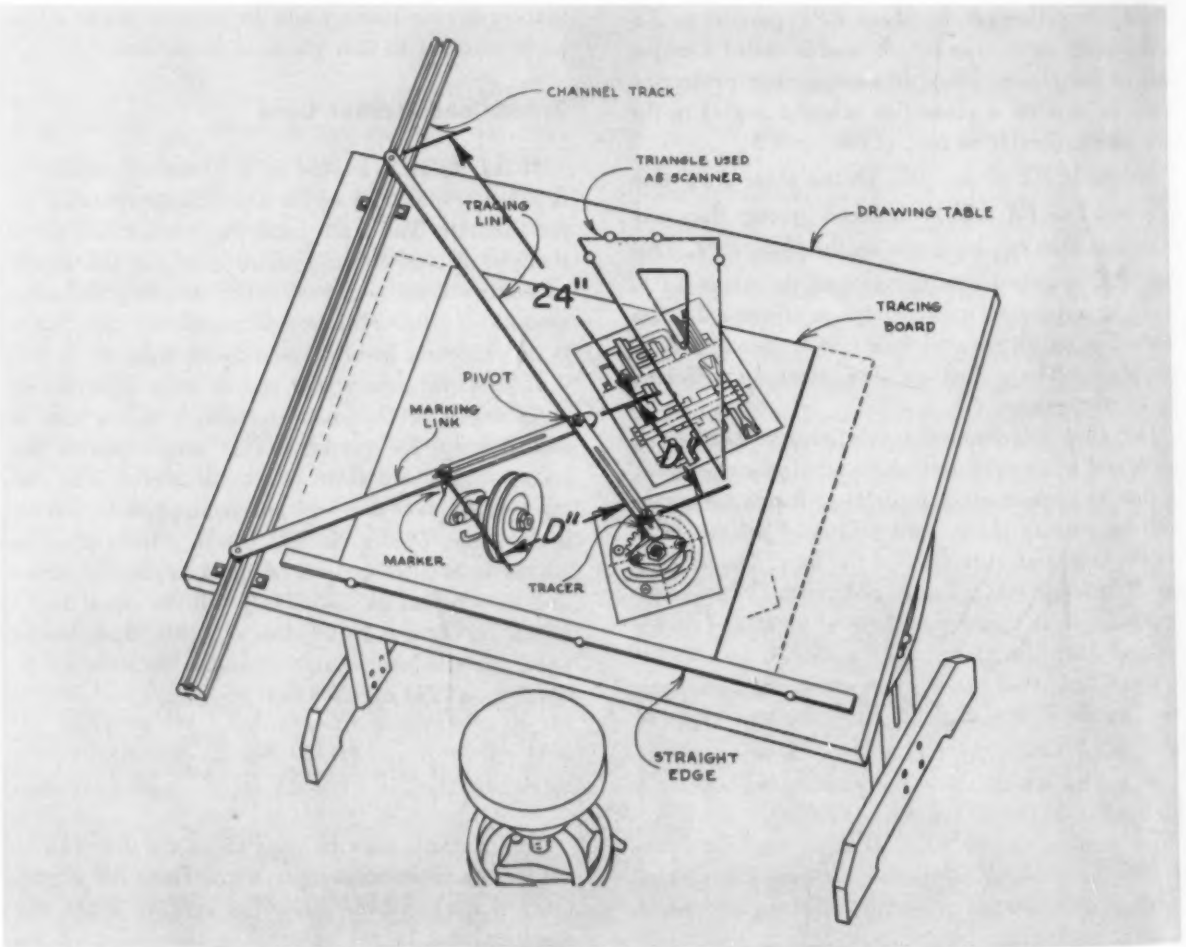
$$\frac{2D}{24 + D}$$

In every case this will be less than the cosine function. In order to increase the length of the line drawn, the scanning action must be done at an angle. The cosecant of the angle will equal the amount of increase. The cosecant of the angle for scanning multiplied by the previous formula must then equal the desired cosine function.

In using the machine it is unnecessary to make these calculations since they have been tabulated. The position of the views being traced may be at any angle and the resulting drawing will be correct. For convenience this may be chosen to be the same as the angles used for scanning. But if a specific projection is desired, a specific angle of position must be used. In *Fig.* 3 angle $P'YX$ was the true angle of position of $\overline{PB}$ in the *B-C* plane. If the normal orthographic plane *B-C* ($P'ZY$) were being traced by the pointer and projected into its axonometric form, PYZ, then the right angle $ZP'Y$ would be arranged with angle $P'YX$ and $P'ZX$ as angles of position. In this case $\overline{ZY}$ would be parallel to the channel track.

In operation, *Fig.* 4, the upper views of the drawing are slid along the straight edge until the scanning edge of the triangle coincides with a line which shows as a shape in the lower view. This may then be traced from the profile in the lower view. Thus, any shape on the lower view may be traced if the corresponding line is located by the scanner in the upper views. If a line in the upper view shows as only a point in the lower view it may be drawn by holding the tracer on the point while the line is scanned by moving the cardboard along the straight edge until the length of the line has passed under the scanner.

Fig. 4. Diagrams of pictorial drafting machine showing relationship of parts. The orthographic views being traced are mounted on the pictorial drawing cardboard, and it is slid along the straight edge to different positions between the dotted lines.



Air is supplied by a 210-cfm diesel-powered compressor to operate the winch for positioning the sid

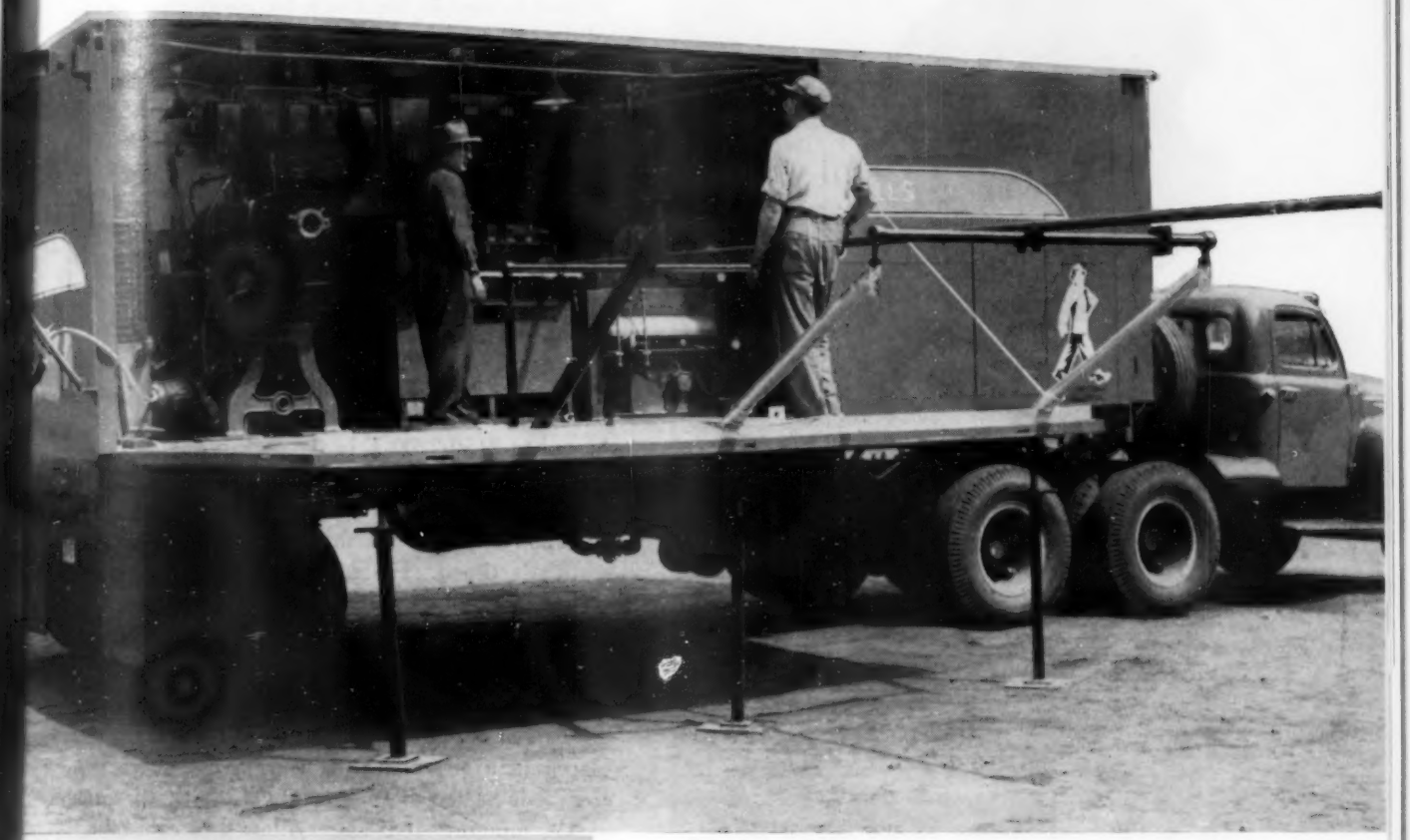


Fig. 1. At the job site, the side of this mobile repair shop is lowered and drill steels are reconditioned. Here a 30-foot rod is being heated in an induction unit prior to being forged. The forward, closed section of the trailer houses an air compressor and a generator.

TOOLING takes to the ROAD

By Harry B. Osborn, Jr.*

Technical Director, Tocco Div.
The Ohio Crankshaft Co.
Cleveland, Ohio

NEW TOOLING and techniques are constantly required as products go into use. The recent experience of Joy Manufacturing Co., Pittsburgh, Pa., illustrates how increasing the size of rock drills can introduce new problems and require radically different solutions.

In the past, smaller drills and drill steels (drifters) have been reconditioned in the shops of the individual users. The new drill, a 5¼-inch percussion type, requires drill steels with 2-inch outside diameters and lengths of from 20 to 50 feet. Since these drifters were too big to be handled in user shops, they had to be sent back to the factory for maintenance and repair. Because of their length and their weight of about ten pounds per foot there was difficulty in shipping them, costs were excessive and much time was lost. The Joy Co. realized that a better method of servicing the equipment was needed —a method that would match the performance record of the drill.

*Senior member ASTE, Cleveland chapter

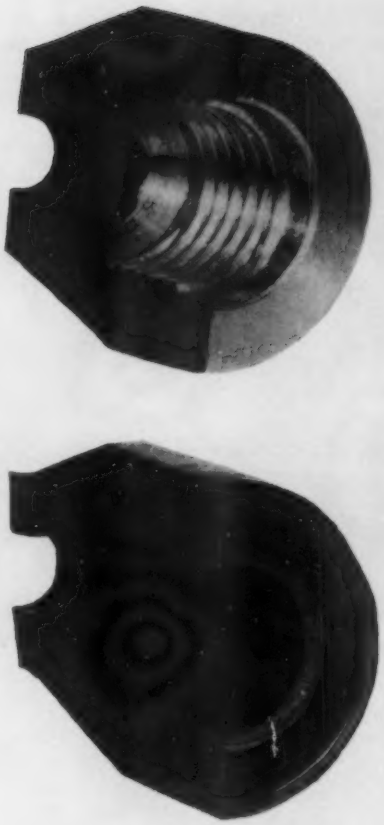


Fig. 2. Upsets are forged on the end of the drill steel, bottom, so that a special internal thread can be machined in it, top. These threads accommodate a connector that holds two drifters together.

Since it was difficult to bring the drill steels to the shop, the obvious solution would involve taking the shop to the drill steels. From this truism grew a mobile shop that travels around to locations where the drills are operating. It is used to periodically recondition broken drifters at the job site, saving the user transportation costs and time normally lost.

The mobile shop is self-sufficient and comprises a truck tractor and an 8 x 23-foot semitrailer. The side of the trailer swings down to form an added working space 14 feet long and 7 feet wide. A cable and pulley system operated by an air winch raises and lowers this platform. With all of its equipment, the unit has a road weight of 48,500 pounds.

At each end of each drifter is an upset with an outside diameter of 3⅛-inches and an inside diameter of 1⅝-inches. Inside this upset is a special 1 23/32-inch, 4-pitch left-hand thread to accommodate a connector that holds two drill steel sections together. Broken drifter ends and bent drill rods are the two major conditioning problems met. The mobile shop is completely equipped to put drill steels back in use.

Air is supplied by a 210-cfm diesel-powered compressor to operate the winch for positioning the side of the trailer and for maneuvering the drifters while they are being worked. A diesel-electric generator supplies 250-volt power to the Tocco high-frequency generator, the upsetter and the milling machine. These units are mounted at the front of the trailer where there are small doors that can be opened for air circulation and inspection. A 20-gallon closed, forced circulation water system is cooled by a radiator mounted in the rear of the trailer. It is used to cool the electrical equipment.

A broken drifter would be reconditioned as follows: The broken end is cut off with an oxyacetylene torch. A 9½ to 10-inch section of the steel is heated to 2150-2200 F in the coil of a 20-kw Tocco induction unit in about seven minutes; not fast for induction heating, but adequate for this application. The power period of this 9600-cps unit is automatically timed. The rod is quickly moved to the upsetting machine that forges the upset in 12 seconds. The upsetter comprises a hydraulically operated clamp that holds the dies while a punch, driven by a T-400 slugger, drives the steel into the cavity.

The rod is allowed to cool in still air and is then placed in a larger heating coil in the Tocco unit. Here it is heated to 1550-1600 F for a timed period of 4½ minutes. It is again allowed to cool in still air. This step improves the grain size and machinability of the steel. After normalizing, the special thread is machined inside the forged upset on a special milling machine.

If it is necessary to straighten the drifters, a hydraulically operated press, powered by the hydraulic system of the upsetter, is used. It is attached to the underside of the trailer by hinges so that it can be swung under the truck when not in use. Ball-bearing rollers, clamped along the edge of the work platform, indicate the degree of straightness achieved.

The final piece of equipment in the trailer is a small electric bench grinder used to sharpen bits or tools and for hand grinding miscellaneous parts.

Two men can handle the drill rods with an air-operated crane. Since detachable steady rests with convenient stops are mounted on the platform, the working of the drill steels can be done by one man while the other prepares for the next operation. Under normal conditions, eight to ten steels can be reconditioned in one workday.

Apart from equipment and machinery needed to recondition steels, the shop is equipped with spare and repair parts for the drills themselves. This means that the user can maintain a smaller inventory of spares because he knows the mobile shop will call on him periodically and add the final touch in this service operation.

Analytical Methods for Deriving Cam Profiles

By Zbigniew Jania

Modern Industrial Engineering Co.
Detroit, Mich.

CAM PROBLEMS have usually been solved graphically in the past, but high operating speeds of present day machinery and high accuracy requirements render graphical methods inadequate due to inherent errors that are difficult to estimate. Also when the profile of a cam is derived graphically, the designer cannot be certain that it will exactly reproduce the type of motion for which it is designed.

Cams are usually applied to automatic machinery to: (1) obtain desired displacement of a follower in a certain time while keeping resulting inertia forces to a minimum and (2) cause a member, i.e., a tool, to follow a pre-determined path or to generate a surface in space. Two or more cams are required for the latter application.

When the object of the design is as in (2), acceleration imparted by the cams and inertia forces induced in the machine members are given consideration to minimize their effects.

The problem of controlling inertia forces and resulting vibration has already been treated in the literature and methods for counteracting effects of these factors have been outlined in detail. The purpose of the present article is to outline, with the aid of examples, general analytical methods for deriving cam profiles.

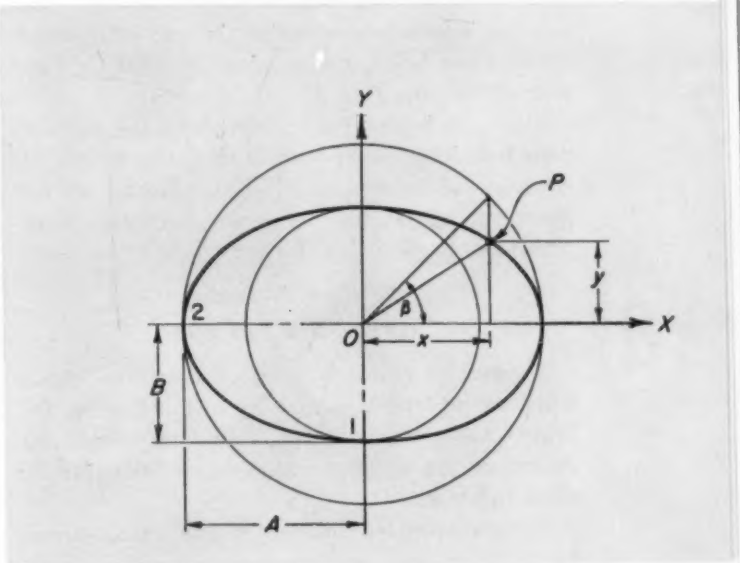
When a design requires only that the motion of the follower take place in a specified period of time and incremental displacements are of minor import, the profile of the cam is derived through a series of mathematical operations. These result in an expression relating stroke and angle through which the cam turns, or a functional relationship between displacement and time.

First, suitable acceleration characteristics for the follower motion are selected and then, by successive integration, the displacement-time (or angle, in case of constant camshaft speed) diagram is obtained.

Displacement, velocity and acceleration diagrams for two extensively used types of cams are given in Appendix I. Neither of these types is suitable for use where high speeds are maintained because acceleration changes suddenly.

Use of an acceleration diagram to derive a displacement-angle equation is illustrated in Appendix II, where a more suitable acceleration diagram has been chosen as the base curve for a cam to be used

Fig. 1. Diagram of a machine member path of elliptical form that is to be produced by two cams.



Nomenclature

a	= Acceleration amplitude, constant
F	= Force, pounds
f	= Acceleration, inches per second per second
N	= Speed, revolutions per minute
S	= Stroke of follower, inches
s	= Displacement, inches
T	= Torque, pound-inches
T_o	= Period of action, sec
t	= Time, seconds
v	= Velocity, inches per second
α_f	= Angular acceleration of oscillating follower, radians per second per second
θ	= Angle turned through by the cam, radians
θ_o	= Angle of action, radians
ω	= Angular velocity of camshaft, radians per second
ω_f	= Angular velocity of oscillating follower, radians per second per second

in high-speed operation. This method of analysis can be used with any other type of acceleration characteristic, provided a mathematical relationship can be established between acceleration and time (or angle).

Displacement—Angle Diagrams

When a combination of cams is to be used to cause a member to follow a predetermined path, acceleration is not the only factor that has to be considered in determination of the displacement-angle relation for the motion of the follower.

Referring to *Fig.* 1, let a toolholder be required to describe a path from 1 to 2 which is a portion of an ellipse having major and minor axes of $2A$ and $2B$ respectively. Two cams may be used to produce the required motion. One cam follower will move along line OX and the other along OY. Considering both followers during the outstroke period, the stroke of follower X, moving along OX, is A and that of follower Y is B.

Since the holder must move along the elliptical path 1–2, its position must at any time satisfy the equation of an ellipse. The coordinates of any point $P(x,y)$ on the curve are conveniently expressed in parametric form as:

$$x = A \cos \beta \quad \text{.....(1a)}$$

$$y = B \sin \beta \quad \text{.....(1b)}$$

The correct approach to the problem is to specify a convenient type of motion for one of the cam followers and then, by using Equations 1a and 1b, determine the displacement-angle equation for the other follower.

For example, let follower X move with simple harmonic motion; equation for which is:

$$x = \frac{A}{2}\left(1 - \cos \frac{\pi}{\theta_o}\theta\right) \quad \text{.....(2)}$$

For every value of x there is a corresponding value of a given by Equation 1a, such that:

$$a = \cos^{-1}\frac{x}{A} \quad \text{.....(3)}$$

Substituting Equation 2 in Equation 3:

$$a = \cos^{-1}\left[\frac{1}{2}\left(1 - \cos \frac{\pi}{\theta_o}\theta\right)\right]$$

and putting this value of a in Equation 1b:

$$y = B \sin\left\{\cos^{-1}\left[\frac{1}{2}\left(1 - \cos \frac{\pi}{\theta_o}\theta\right)\right]\right\} \quad \text{....(4)}$$

To obtain positive motion in both directions, see *Fig.* 2, Equation 4 is modified to:

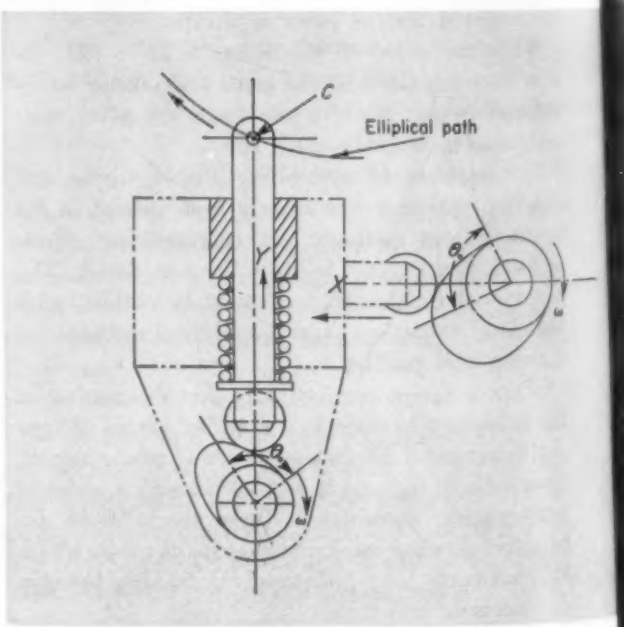
$$y = B\left(1 - \sin\left\{\cos^{-1}\left[\frac{1}{2}\left(1 - \cos \frac{\pi}{\theta_o}\theta\right)\right]\right\}\right)$$

This modification is necessary because Equation 4 gives values of y that decrease as θ increases. Equation 4a gives values of y that increase as θ increases, and thus satisfies the requirements for the motion.

It would not be practical to terminate the stroke of follower Y at point F, *Fig.* 3(a), because of undesirable acceleration characteristics of the motion. The working stroke of the follower would still be B, but additional stroke would be provided beyond the required elliptical path to end the motion smoothly and without shock. Also, equal angles of action and equal speeds should be used for both cams.

The principle of obtaining a specified path for a machine member just outlined can also be applied

Fig. 2. Physical relationships between two cams and their followers to give an elliptical movement to a machine member.



to such problems as gear grinding and chamfering. For such applications, the two cams would be designed to give a combined motion along an involute curve.

Calculating Cam Profiles

When the displacement-angle diagram, often referred to as the base curve, has been determined, it is then necessary to calculate coordinates of the cam profile. These calculations depend on the type of cam follower to be used: (a) reciprocating, (b) reciprocating offset and (c) oscillating. Followers can be further subdivided into classes by follower end styles, but since the majority of cams operate roller-end followers, only this type will be considered.

Referring to *Fig.* 4, let the displacement-angle curve represent a function such that:

$$s = f(\theta)$$

which can theoretically be of any desired form. This curve and notation will be used to construct cam profiles for each of the cam follower classes.

Reciprocating Follower: Displacement of the follower is determined by the displacement of the roller center. After the minimum radius of the cam has been chosen, *Fig.* 5, the lowest position of the roller center with respect to the cam centerline is determined. Let the distance between the two centers be R, and the curve that is the locus of roller center positions can be imagined to move in a direction opposite to that of cam rotation. This curve is conveniently expressed in polar coordinates (r,θ) as:

$$r = R + f(\theta) \ldots\ldots (5)$$

To better illustrate the method, let the cam be a constant acceleration type in which (see Appendix I) $K = 2$ and $\theta_0 = 3\pi/2$ radians. Then:

$$r = R + \frac{4S}{3\pi^2}\theta^2 \ldots\ldots\ldots\ldots (6)$$

When, for simplicity, only the period from O to θ is considered, Equation 6 describes Curve 1 in *Fig.* 5. This curve is called the pitch line.

Generally, it is sufficient to dimension the cam by using Equation 6; indicating the cutting distances of the cutter from the cam centerline in as many locations as needed to give the required accuracy. The

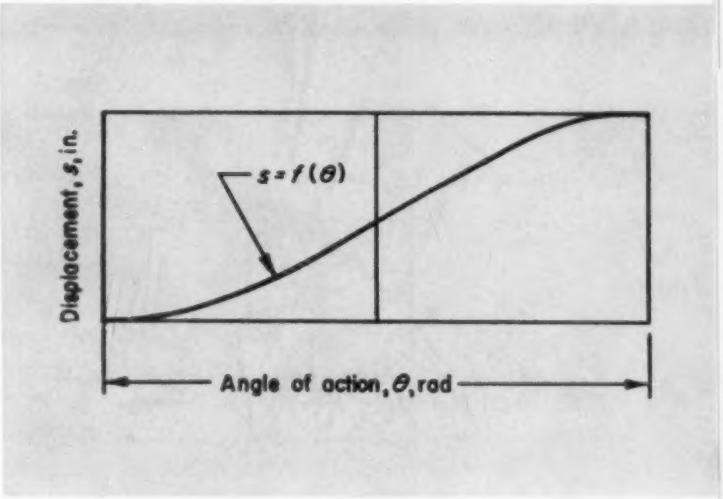
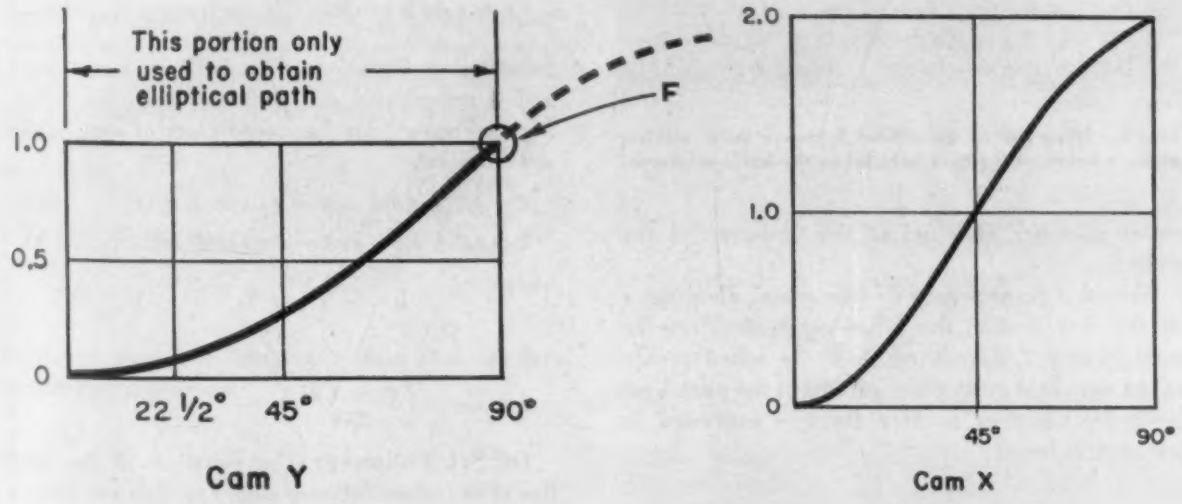


Fig. 3. (below) Displacement-angle curves for the two cam systems indicated in *Figs.* 1 and 2.

Fig. 4. (top right) Completely general representation of a displacement-angle curve that can theoretically be of any desired form.



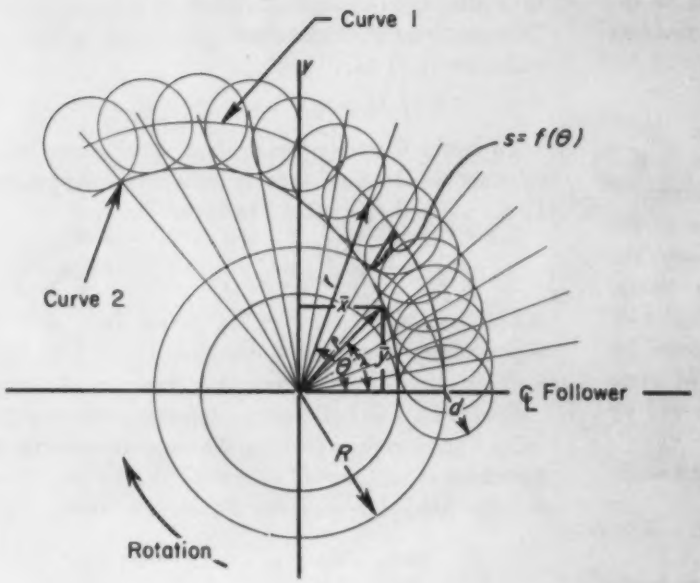


Fig. 5. Diagram of a reciprocating follower with motion along the horizontal axis.

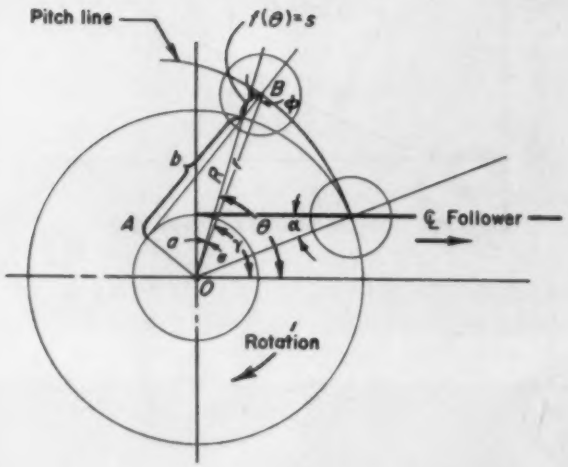


Fig. 6. Diagram of an off-set follower with motion along a horizontal plane parallel to the horizontal axis.

cutter diameter is equal to the diameter of the roller.

Should it be necessary to give actual dimensions of the cam profile, the following method can be used. Curve 2, *Fig.* 5, which is the actual profile of the cam, is at every point parallel to the pitch line, given by Equation 6. If a curve is expressed in parametric form:

$$x = \phi\ (t)$$
$$y = \psi\ (t)$$

the equation of another curve parallel to it is expressed by:

$$X = \phi t - \frac{d\psi' t}{\sqrt{[\phi'(t)]^2 + [\psi'(t)]^2}} \quad \ldots\ldots (7)$$

$$Y = \psi t - \frac{d\phi' t}{\sqrt{[\phi'(t)]^2 + [\psi'(t)]^2}} \quad \ldots\ldots (8)$$

where d = perpendicular distance between the curves (radius of the roller in this case).

$$\phi' t = dx / dt$$
$$\psi' t = dy / dt$$

Equation 6 is first expressed in parametric form using θ as the parameter:

$$x = r\cos\theta = \left(R + \frac{4S}{3\pi^2}\theta^2\right)\cos\theta \quad \ldots\ldots (9)$$

$$y = r\sin\theta = \left(R + \frac{4S}{3\pi^2}\theta^2\right)\sin\theta \quad \ldots\ldots (10)$$

Substituting Equations 9 and 10 in Equations 7 and 8 respectively and differentiating, the following expressions for the coordinates of cam profile are obtained:

$$X = (R + K\theta^2)\cos\theta - d\sin(\theta + \alpha) \quad \ldots\ldots (11a)$$
$$Y = (R + K\theta^2)\sin\theta - d\cos(\theta + \alpha) \quad \ldots\ldots (11b)$$

where

$$K = \frac{4S}{3\pi^2}$$

$$\alpha = \tan^{-1}\left(\frac{R + K\theta^2}{2K\theta}\right)$$

Off-Set Follower: The equation of the pitch line of the off-set follower cam, *Fig.* 6, is not difficult to obtain in polar form, but is cumbersome to

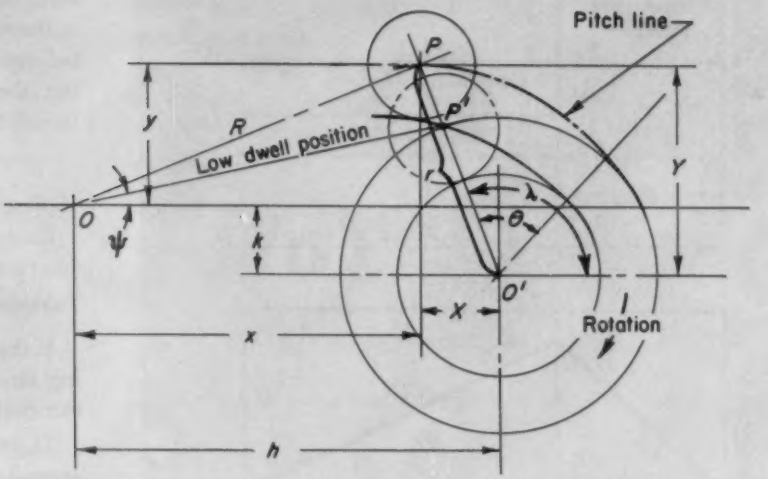


Fig. 7. Diagram of an oscillating follower, with limits of motion indicated by circles with centers of *P* and *P'*.

use. For the purpose of dimensioning the pitch line for machining purposes, it is therefore necessary to give the amount of off-set of the centerline of the cam, *AB*, and the angle θ. By inspection, it is evident that:

$$AB = b + f(\theta)$$
$$= R\cos\alpha + f(\theta)$$

Should it be desired to give pitch line dimensions in polar form, with *O* as the origin, the following equations apply:

$$r = \sqrt{R^2 + 2Rf(\theta) + [f(\theta)]^2}$$
$$\gamma = (\theta - \alpha) + \tan^{-1}\frac{a}{b + f(\theta)}$$

Oscillating Follower: For such a design, the displacement of the roller center takes place along a circular arc. The displacement *s*, as given by the function $s = f(\theta)$, is the length of arc *P' P* as shown on *Fig.* 7. With respect to follower pivot point *O*, *h* and *k* give the location of the center of the cam, *O'*.

The coordinates of the roller center *P*, with respect to *O*, are:

$$x = R\cos\left(\psi + \frac{f(\theta)}{R}\right)$$
$$y = R\sin\left(\psi + \frac{f(\theta)}{R}\right)$$

By transferring coordinates *x*, *y* from *O* to *O'*, the resulting equations are:

$$X = R\cos\left(\psi + \frac{f(\theta)}{R}\right) - h \quad \text{.....(12)}$$

$$Y = R\sin\left(\psi + \frac{f(\theta)}{R}\right) + k \quad \text{.....(13)}$$

Equations 12 and 13 are parametric equations of the pitch line, and must be changed to polar form by transformation:

$$r = \sqrt{X^2 + Y^2}$$
$$\lambda = \tan^{-1}\frac{Y}{X}$$

It is not necessary to use angle λ since angle θ is known and it is convenient to give dimensions of the pitch line in terms of it.

Equations 12 and 13 do not lend themselves to direct use, so the dimensioning can be indicated in tabular form with *r* calculated for as many divisions of angle as necessary.

Follower Velocity and Acceleration

Reciprocating Followers: To obtain expressions for velocity and acceleration of the follower in terms of shaft speed, it is necessary to express the displacement equation in terms of time and then substitute $t = \theta/\omega$ for time. Using Equation 5 from Appendix II as an example:

$$s = S\left(\frac{\theta}{\theta_0} - \frac{1}{2\pi}\sin\frac{2\pi}{\theta_0}\theta\right)$$

and expressing it in terms of time:

$$s = S\left(\frac{t}{T_0} - \frac{1}{2\pi}\sin\frac{2\pi}{T_0}t\right)$$

Now

$$v = \frac{ds}{dt} = \frac{S}{T_0} - \frac{S}{T_0}\sin\frac{2\pi}{T_0}t \quad \text{.....(14)}$$

putting $T_0 = \theta_0/\omega$ and $t = \theta/\omega$

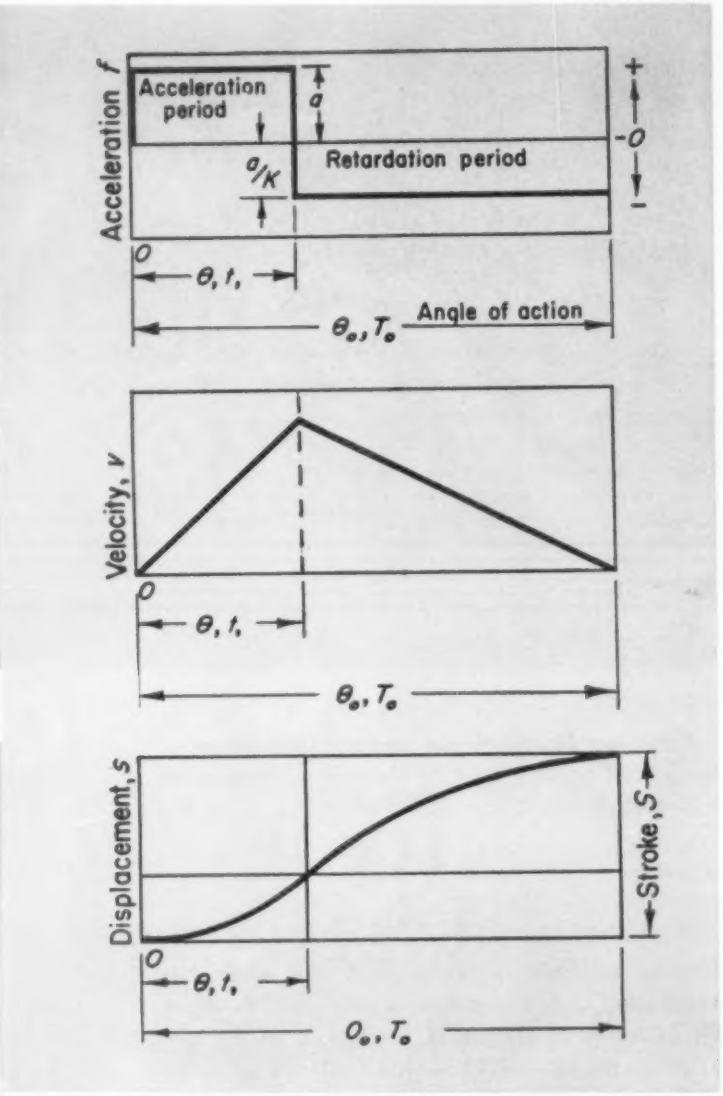


Fig. 8. Family of curves indicating acceleration, velocity and displacement of the follower for a uniform acceleration cam.

$$v = \frac{\omega S}{\theta_o}\left(1 - \cos\frac{2\pi}{\theta_o}\theta\right)$$

$$= \frac{0.1047N}{\theta_o}\left(1 - \cos\frac{2\pi}{\theta_o}\theta\right) \quad \text{.....(14a)}$$

Similarly, by differentiating Equation 14 and making substitutions as above, an expression for follower acceleration is obtained:

$$f = \frac{2\pi}{\theta_o^2}\frac{\omega S}{\sin}\frac{2\pi}{\theta_o}\theta$$

$$= \frac{2\pi S \times 0.0109N^2}{\theta_o^2}\sin\frac{2\pi}{\theta_o}\theta \quad \text{.....(15)}$$

where ω = angular velocity in radians per second
N = shaft speed, revolutions per minute

Oscillating Follower: Equation 14a and 15 can be used to determine peripheral velocity and tangential acceleration of an oscillating follower roller center. If it is necessary to obtain angular velocity and centripetal acceleration of the follower arm (angular acceleration is used to calculate the stiffness of the return spring necessary to keep the follower roller in contact with the cam profile during the return stroke), the above equations are transformed by substituting:

$$\omega_f = \frac{v}{R}$$

$$\alpha_f = \frac{v^2}{R}$$

Torque

If the work done by the follower during its working stroke is known, the camshaft torque required can easily be computed.

The work done by a reciprocating follower, for example, is usually expressed as a function of the follower displacement. To obtain the torque equation, it is necessary to express work in terms of the angle through which the cam turns during the follower stroke. This is done by using the displacement equation: $s = f(\theta)$.

Consider a portion of the displacement of a uniformly accelerated follower (Appendix I). The follower acts against a force that increases uniformly with distance (the condition of a follower acting against a preloaded spring) which can be expressed as:

$$F = As + C$$

where A = rate of spring, pounds per inch
C = amount of preload, pounds

Work done against the force is:

$$W = \int F\,ds = \frac{1}{2}As^2 + Cs$$

For a uniformly accelerated follower ($K = 1$) and

$$s = \frac{2S}{\theta_o^2}\theta^2$$

Therefore, W can be expressed in terms of θ as:

$$W = \frac{1}{2}A\frac{4S^2\theta^4}{\theta_o^4} + C\frac{2S}{\theta_o^2}\theta^2 \quad \text{.....(16)}$$

Work done by a turning moment is given by:

$$W = \int T\,d\theta \quad \text{.....(17)}$$

Neglecting friction, Equations 16 and 17 must express the same amount of work, therefore:

$$\int T\,d\theta = \frac{1}{2}A\frac{4S^2\theta^4}{\theta_o^4} + C\frac{2S\theta^2}{\theta_o^2}$$

or

$$T = \frac{d}{d\theta}\left(\frac{1}{2}A\frac{4S^2\theta^4}{\theta_o^4} + C\frac{2S\theta^2}{\theta_o^2}\right)$$

$$T = \frac{8AS^2\theta^3}{\theta_o^4} + \frac{4SC\theta}{\theta_o^2} \text{ pound-inches.}$$

Appendix I

Two of the most commonly used types of cams are anlyzed below and relative equations for displacement, acceleration and velocity are given for each. These equations are expressed both in terms of time as a variable and angle of action as a variable. This can only be done if the cam speed is constant, which is usually the case in practice.

Uniform Acceleration Cam: Since the period during which the follower accelerates is not usually equal to that of retardation, see *Fig.* 8, a constant, K, is used to simplify the equations. The definition of K is shown by the following relation:

$$\frac{\text{Acceleration period}}{\text{Retardation period}} = \frac{1}{K}$$

Because the follower displacement is a discontinuous function, two sets of equations are necessary to fully describe its displacement, velocity and acceleration during the stroke. Pertinent equations follow:

I. In terms of angle action with θ as the variable:

From $\theta = 0$ to $\theta = \theta_1$:

$$\text{Acceleration} = f = 2(1 + K)\frac{S\omega^2}{\theta_o^2}$$

$$\text{Velocity} = v = 2(1 + K)\frac{S\omega}{\theta_o^2}\theta$$

$$\text{Displacement} = s = (1 + K)\frac{S}{\theta_o^2}\theta^2$$

From $\theta = \theta_1$ to $\theta = \theta_o$:

$$\text{Acceleration} = f = -\frac{2(1 + K)S\omega^2}{K\theta_o^2}$$

$$\text{Velocity} = v = \frac{2(1 + K)S\omega}{K\theta_o^2}(\theta_o - \theta)$$

$$\text{Displacement} = s = S\left[1 - \frac{(1 + K)(\theta - \theta_o)^2}{K\theta_o^2}\right]$$

II. In terms of time with t as the variable:

From $t = 0$ to $t = t_1$:

$$\text{Acceleration} = f = 2(1 + K)\frac{S}{T_o^2}$$

$$\text{Velocity} = v = 2(1 + K)\frac{S}{T_o^2}t$$

$$\text{Displacement} = s = (1 + K)\frac{S}{T_o^2}t^2$$

From $t = t_1$ to $t = T_o$:

$$\text{Acceleration} = f = -\frac{2(1 + K)S}{KT_o^2}$$

$$\text{Velocity} = v = \frac{2(1 + K)S}{KT_o^2}(T_o - t)$$

$$\text{Displacement} = s = S\left[1 - \frac{(1 + K)(T_o - t)}{KT_o^2}\right]$$

The above formulas enable determination of position, velocity and acceleration at any instant of time or at any angle of cam rotation.

Simple Harmonic Motion Cam: Since the action of a simple harmonic motion cam is a continuous function, see *Fig.* 9, only one set of equations is required for determining acceleration, velocity and displacement. Equations are grouped in terms of angle of action as the variable and in terms of time.

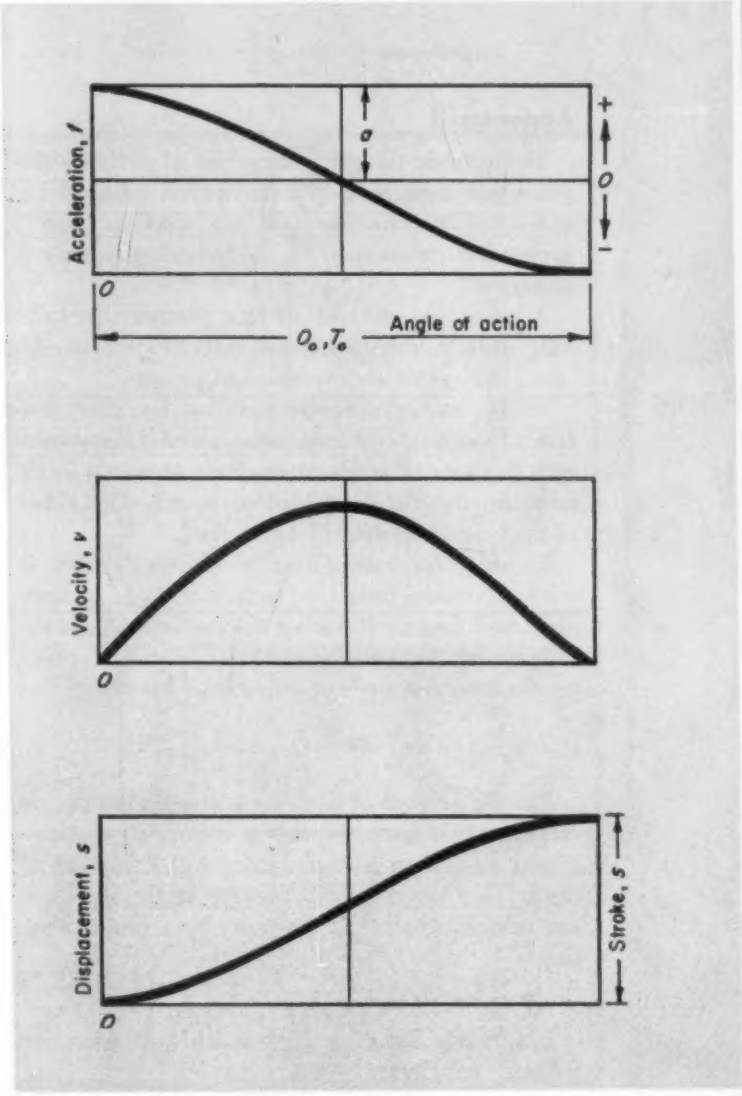
I. In terms of angle of action with θ as the variable:

$$\text{Acceleration} = f = \frac{\pi^2\omega^2 S}{2\theta_o^2}\cos\frac{\pi}{\theta_o}\theta$$

$$\text{Velocity} = v = \frac{\pi\omega S}{2\theta_o}\sin\frac{\pi}{\theta_o}\theta$$

$$\text{Displacement} = s = \frac{S}{2}\left(1 - \cos\frac{\pi}{\theta_o}\theta\right)$$

Fig. 9. Family of curves indicating acceleration, velocity and displacement of the follower for a cam with simple harmonic motion.



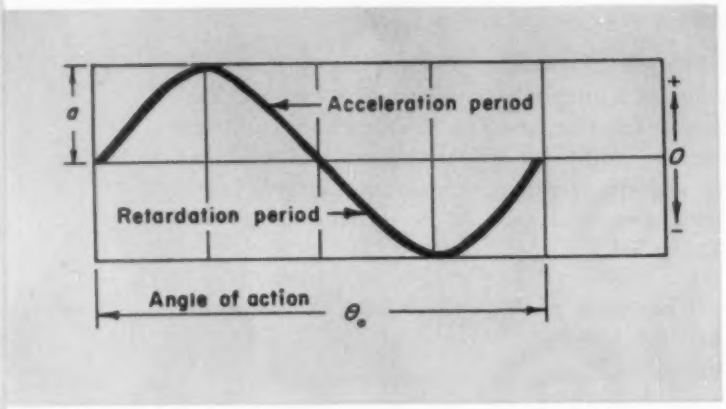


Fig. 10. Acceleration-angle diagram for the follower of a cam having acceleration as a sine function of the cam position.

II. In terms of time with t as the variable:

$$\text{Acceleration} = f = \frac{\pi^2 S}{2T_o^2} \cos \frac{\pi}{T_o} t$$

$$\text{Velocity} = v = \frac{\pi S}{2T_o} \sin \frac{\pi}{T_o} t$$

$$\text{Displacement} = s = \frac{S}{2} \left(1 - \cos \frac{\pi}{T_o} t\right)$$

Appendix II

To illustrate the general method of deriving displacement-angle or displacement-time relations between follower motion and cam position from a given acceleration diagram, the following example is presented.

All formulas derived in this manner are valid only when camshaft angular velocity (ω) is constant. All angles are expressed in radians.

In this example, the acceleration is a sine funtion of the angle of cam rotation. A cam system with this type of acceleration characteristic is much more suitable for use with high speeds than either of the types described in Appendix I.

In order for acceleration to change from 0 to (+) maximum, from (+) maximum to (—) maximum and then to 0 during the period of the total follower stroke, see *Fig.* 10, the relation between acceleration and angle of action must have the form:

$$f = a \sin \frac{2\pi}{\theta_o} \theta \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

For the purpose of deriving a displacement-angle diagram, it is more convenient to express acceleration as a function of angle rather than a function of time. This can be done because angle and time are related, when ω is constant, by a linear function:

$$\theta = \omega t$$

Integrating Equation 1 gives an expression for follower velocity:

$$v = \int f \, d\theta = a \int \sin \frac{2\pi}{\theta_o} \theta d\theta$$

$$= -\frac{a\,\theta_o}{2\pi} \cos \frac{2\pi}{\theta_o} + C_1$$

Conditions at the beginning of the stroke are such that $v = 0$ when $\theta = 0$, therefore:

$$0 = -\frac{a\theta_o}{2\pi} \cos 0 + C_1$$

hence $C_1 = \frac{a\theta_o}{2\pi}$

$$v = -\frac{a\theta_o}{2\pi} \cos \frac{2\pi}{\theta_o} + \frac{a\theta_o}{2\pi} \quad \ldots\ldots\ldots (2)$$

When Equation 2 is integrated, an expression for displacement of the follower is obtained:

$$s = \int v \, d\theta = \int \left(-\frac{a\theta_o}{2\pi} \cos \frac{2\pi}{\theta_o} \theta + \frac{a\theta_o}{2\pi}\right) d\theta$$

$$= -\frac{a\theta_o^2}{4\pi^2} \sin \frac{2\pi}{\theta_o} \theta + \frac{a\theta_o}{2\pi} \theta + C_2$$

When the stroke $s = 0$, $\theta = 0$, hence $C_2 = 0$, and:

$$s = \frac{a\theta_o}{2\pi} \theta - \frac{a\theta_o^2}{4\pi^2} \sin \frac{2\pi}{\theta_o} \theta \quad \ldots\ldots\ldots (3)$$

The form of Equation 3 is not convenient to use since it contains an arbitrary constant, a (the amplitude of acceleration). To simplify its use, it will be expressed in terms of the total stroke and angle of action with the angle θ as the variable.

Conditions at the end of the stroke are such that: $s = S$ and $\theta = \theta_o$

Substituting these in Equation 3:

$$S = \frac{a\theta_o^2}{2\pi} - \frac{a\theta^2_o}{4\pi^2} \sin 2\pi$$

Therefore $S = \frac{a\theta^2_o}{2\pi} + a = \frac{2\pi S}{\theta_o^2} \quad \ldots\ldots\ldots (4)$

Substituting this value of a into Equation 3:

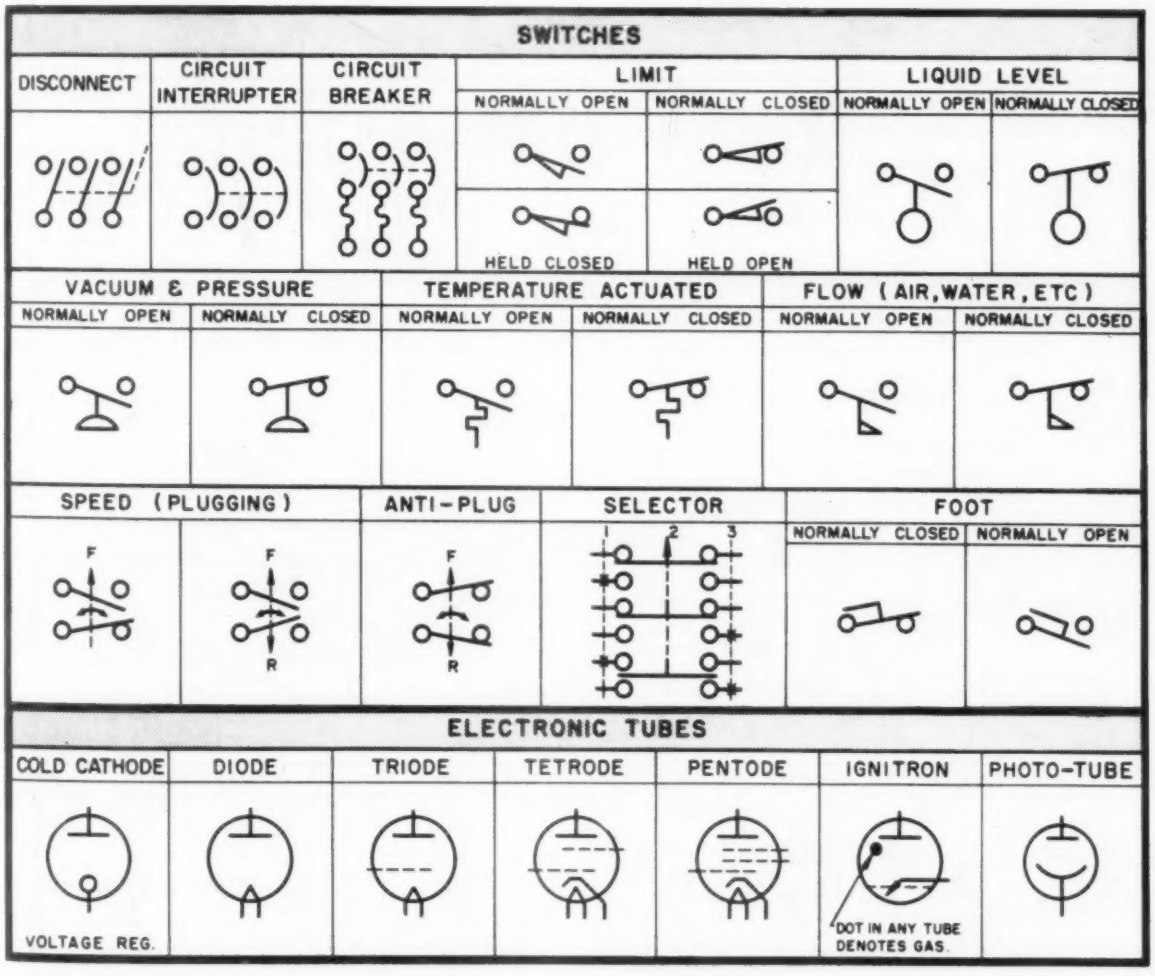
$$s = S \left(\frac{\theta}{\theta_o} - \frac{1}{2\pi} \sin \frac{2\pi}{\theta_o} \theta\right) \ldots\ldots (5)$$

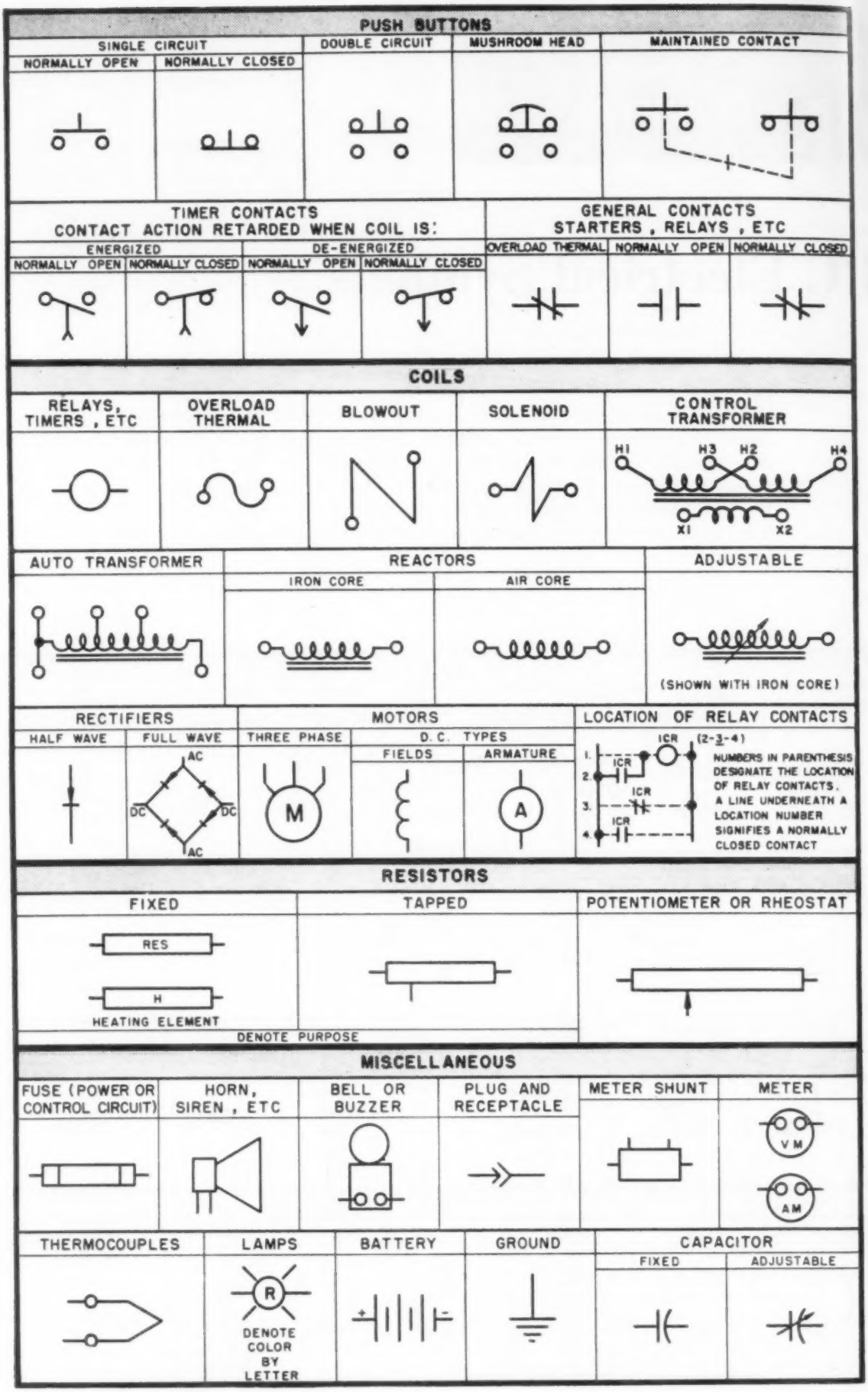
Equation 5 gives the relation between displacement and the angle turned through by the cam during the follower stroke.

Equation 4 indicates that the amplitude of acceleration varies directly as the stroke and is inversely proportional to the square of the angle of action. To keep the acceleration as small as possible, the angle of action must be made as large as possible and the follower stroke as short as possible. This is generally true, no matter what form of acceleration diagram is chosen, and it is for this reason that the constant a be given careful consideration when selecting an acceleration diagram to be used with a cam profile.

JIC Electrical Symbols

THE 1953 JOINT INDUSTRY CONFERENCE in revising electrical standards for industrial equipment has made additions. The symbols shown represent those most applicable to machine tools and industrial equipment. The JIC Standards recommends choice of other symbols that may be required from the American Standard Graphical Symbols for Power and Control Z32.3, the Graphical Symbols for Electronic Devices, Z32.10, or NEMA Standards for Industrial Control IC 1-23.1.





Coming MEETINGS

news



featured this month . .

Chapters Wind Up Summer Activities 94, 95
Coming Meetings 92
David Schrom Named to Editorial Committee 93
New Subcommittee Formed by ASTE Standards Group 97
Officers of Indiana Chapters Meet ... 93
Philip Harvey Joins ASTE Technical Staff 96
Positions Available, Positions Wanted 96
Tri-Chapter Meeting Scheduled for Baltimore 96
West Coast News 98

Boston 96
Dayton 96
Detroit 95
Chautauqua-Warren 96
Fond du Lac 94
Houston 97
Kansas City 93
Lima 98
Los Alamos 98
Louis Joliet 93
North Texas 97
Peoria 94
San Diego 97
San Fernando Valley 92, 93
Santa Clara Valley 98
Toronto 97
Tucson 97

Student ASTE Group Officers

Coming MEETINGS

COMBINED MEETING of Baltimore, Central Pennsylvania and Greater Lancaster chapters, Oct. 3 at Baltimore. Registration 9 a.m., Munder's Laurville House, followed by dinner meeting at Laurville House. Tour of Bethlehem Steel Co.

SEMI-ANNUAL MEETING of the ASTE Board of Directors, Oct. 30-31, Biltmore Hotel, Dayton, Ohio.

ATLANTA—Oct. 19, "American System and Tools" by C. M. Clark of Cincinnati Milling Machine Co., Cincinnati.

CINCINNATI—Oct. 19, 8:00 p.m. Tour of Cleveland Automatic Machine Co., Norwood, Ohio.

CLEVELAND—Oct. 9, "An Evaluation of Drawing vs. Spinning" by John W. Lengbridge of Aluminum Goods, Ltd., Toronto.

DETROIT—Oct. 8, 4 p.m., tour of Dearborn Engineering Area, Ford Motor Co., 6 p.m., dinner and technical session at the Administration Bldg. "Working Relationship between Tool Engineers and the Ford Engineering Groups" by C. F. Kramer, chief body engineer, Ford Motor Co.; W. E. Burnett, chief engineer, Ford car; and C. M. Clayton, assistant chief engineer.

FORT WAYNE—Oct. 14, 6:45, Chamber of Commerce. "Multiple Spindle Drilling" by J. P. Mrsnik of Zager Tool, Inc.

GOLDEN GATE—Oct. 21. "The Hydroform, a New Kind of Machine Tool" by K. P. Martin, Cincinnati Milling Machine Co., Inc., Cincinnati.

GREATER LANCASTER—Oct. 13, 6:30 p.m. Campus Room, Franklin and Marshall College. "Verson Hydraulic Forming System and Transmat Presses" by Merle D. Verson, vice president, Verson Allsteel Press Co.

HARTFORD—Oct. 15, 6 p.m., Hartford City Club. "High Speed Photography as a Tool for Industry" by M. L. Sandell, director of highspeed photography sales, Eastman Kodak Co., Rochester, N. Y.

HOUSTON—Oct. 13, 6:30 p.m., Ben Milam Hotel. "High Velocity Turning with Carbides" by J. C. Hebert, sales manager, Jones and Lamson Machine Co., Springfield, Vermont.

INDIANAPOLIS — Oct. 1. "Industrial Vacuum Usage" by R. Whittington and L. Stearn of the Whittington Pump Co., Indianapolis.

LIMA—Oct. 15, 6:30 p.m., Royal Pine Room. "Tool and Die Welding" by F. E. Kessler of Welding Equipment and Supply Co., Detroit.

LITTLE RHODY—Oct. 1. "Tool of Multiple Slide Machines" by A. Melnick, chief tool engineer, U.S. Tool Co., Inc., East Orange, N.J.

LONG ISLAND—Oct. 12, 8:30 p.m., Garden City Hotel. "Heat Treating" by James McElgin, sales engineer, E. F. Houghton & Co., Philadelphia, Pa. Oct 24, Garden City Hotel. Dinner dance.

LOUISVILLE—Oct. 13. Tour of U.S. Naval Ordnance Plant.

NORTH TEXAS—Oct. 9, 7:30 p.m., International Airport. "How the Tool Engineer Can Use Silicones" by M. H. Leavenworth, Dallas division manager, Dow Corning Corp., Midland, Mich.

ROCKFORD—Oct. 8. "Die Design for Die Casting" by Austin Lillegren of Madison-Kipp Corp., Madison.

SCHENECTADY—Oct. 8. "Recent Development in Automatic Screw Machines" by Clarence H. Adams, consulting engineer, Cone Automatic Machine Co., Windsor, Vt.

SPRINGFIELD (ILL.)—Oct. 6. "Latest Developments in the Turning Field" by a representative of the Monarch Machine Tool Co.

ST. LOUIS—Oct. 1, De Soto Hotel. Dinner meeting. "Hydraulic Multi-Presses" by a representative of Denison Engineering Co., Columbus, Ohio.

TUCSON—Oct. 13, 8:00 p.m., University of Arizona, Humanities Bldg. "Hydroforming of Metals" by Kenneth Martin of Cincinnati Milling Machine Co., Inc.

TORONTO—Oct. 7. A talk on the Society by Joseph P. Crosby, national first vice president ASTE, and vice president of LaPointe Machine Tool Co., Hudson, Mass. "Tooling for Jet Propulsion" by K. N. Macomber, chief service engineer, LaPointe Machine Tool Co.

WORCESTER—Oct. 6, Sheraton Hotel. Annual executive night meeting. Speaker will be the Honorable C. A. Herter, governor of Massachusetts.



Thomas J. Donovan, Jr.

San Fernando Valley Has First Anniversary

North Hollywood — San Fernando Valley chapter's first anniversary was an occasion for celebration on August 5. The birthday party was held at Hody's Restaurant and some 225 members and their wives were on hand to enjoy the festivities including dinner, program and dancing.

Thomas J. Donovan, Jr., a national director of ASTE, was special guest of the evening. He conducted his well-known quiz and congratulated the chapter for its successful first year in which membership reached 307 and the treasury achieved a sound financial basis.

Several other national representatives of ASTE were present. Besides Mr. Donovan, Wayne Ewing, national assistant secretary-treasurer; Ben Hazewinkel, a national director; and Ralph Chrissie, member of the National Program Committee and past chairman of the Los Angeles chapter; attended.

The coffee speaker, "Professor" Russell B. Lindskog, entertained the group with a humorous dissertation on atomic energy. C. L. Goodspeed, chapter treasurer, was awarded a *Tool Engineers Handbook* for his efforts in sponsoring the most new members during the year's membership drive.

Two hours of dancing followed the program and gifts were presented to all who attended the event.

—H. T. Young

Named Superintendent

John Wood, member of the Boston ASTE chapter, has been promoted to superintendent of Peter Gray Corp. of Cambridge, Mass. Mr. Wood was formerly an industrial engineer for the company.



Student ASTE Group Installs Officers

Lawrence, Kan.—The Faculty Club of the University of Kansas was the scene of installation ceremonies for officers of the student group affiliated with the Kansas City chapter.

Joe Gardner gave a resume of the past year's activities, highlighting field trips the group had taken. Grant Snyder, faculty advisor to the student organization, spoke on the meaning of ASTE, its benefits to the students, and cited THE TOOL ENGINEER as a most worthwhile source of knowledge and information.

Featured speaker for the evening was Pat Read, an expert on the life and customs of the American Indian.

Guests representing the Kansas City chapter at the installation were: Merlin Grundy, chairman; John Hoover, past chairman; Amber Brunson, past chairman; Maurice Manning, treasurer; and Winton Jenson, secretary.

—R. W. Corliss



Gene Brunson, second from left, was re-elected at a recent meeting to lead activities of the student group affiliated with the Kansas City ASTE chapter. Shown with him at the installation are other officers who will be serving during the next year. From left: Elbert Bayne, treasurer; Mr. Brunson; Norman Wilson, vice chairman; and Rameshandra Premji, secretary. Alan Levin is the group's parliamentarian and Grant Snyder is faculty advisor. A number of officers of the Kansas City parent organization were present for the meeting.

David Schrom Named to ASTE Editorial Committee

The appointment of David A. Schrom, member of the Central Pennsylvania ASTE chapter, to the National Editorial Committee has been announced by Chairman Joseph L. Petz. Mr. Schrom, who is a registered professional engineer, is shop superintendent at the York Corp. in York, Pa.

First Outing Scores Success

Lemont, Ill—Louis Joliet chapter members held their first annual golf outing this year. More than 115 members and their guests met at Cog Hill Country Club for the program which also included a steak dinner and distribution of various prizes.

—H. E. Freier

Officers of Indiana ASTE Chapters Meet

Indianapolis—As an outgrowth of the friendships made at the Leadership Conference in Detroit last March 20, officers of the six Indiana ASTE chapters met on Saturday, August 22, in Indianapolis. The meeting had been arranged at the Detroit conference.

The purpose of the meeting was to achieve a closer relationship between the Indiana chapters, to exchange views on conducting chapter meetings, pool ideas for promoting ASTE, and to discuss possible improvements at both the chapter and national levels.

The meeting started at 10 a.m. at Jones Restaurant, east of Indianapolis. It was decided to organize the group as the "Indiana ASTE Chapter Council." James Kemp of South Bend, who conceived the idea of the meeting, was elected chairman of the meeting. He was also made the temporary chairman until the next meeting, when the organization will be completed.

Evansville's representative was Chairman Paul Vierling. Donald Welbaum, chairman, and Blaine I. Garard, first vice chairman, attended in behalf of Fort Wayne. Muncie sent Chairman Norman Hines.

Four members from Richmond were on hand for the meeting: Russell Culbertson, chairman; Carl Van Ausdall, first vice chairman; George Shimer, secretary; and Mervin Culbertson, past chairman.

South Bend was represented by Chairman James Kemp who was also elected chairman of the meeting, and Harold Housewerth, first vice chairman.

Hosts from the Indiana chapter were: Joe Penn, chairman; Joseph Enright, first vice chairman; Ted Harding, second vice chairman; Lloyd Refer, secretary; Lloyd Turner, treasurer; H. D. Hiatt, historian; John Huser, chairman of the public relations committee; Leo Feeney, entertainment; Marshall Rosenbarger, editorial chairman; and Byron Confer, chairman of the membership committee.

—Joe Penn



Seated at the speakers' table for the first anniversary celebration of the San Fernando Valley chapter were: Art Lewis, past chairman; Mrs. Lewis; Henry T. Young, second vice chairman; Mrs. Young; Kurt Kerseg, first vice chairman; Mrs. Kerseg; Thomas J. Donovan, Jr., a national director of ASTE; and Rudolf Regan, chapter chairman.



This smiling contingent was responsible for handling the details of the Peoria picnic which boasted an attendance of 600. Each is pictured with the items or props characteristic of his duties. Kneeling, from left, are: Eugene Martin, Russ Saurs, Earl Clancy, Harol Baker and Edward Weber. Standing are Harold Austin and Wilbur McWilliams.

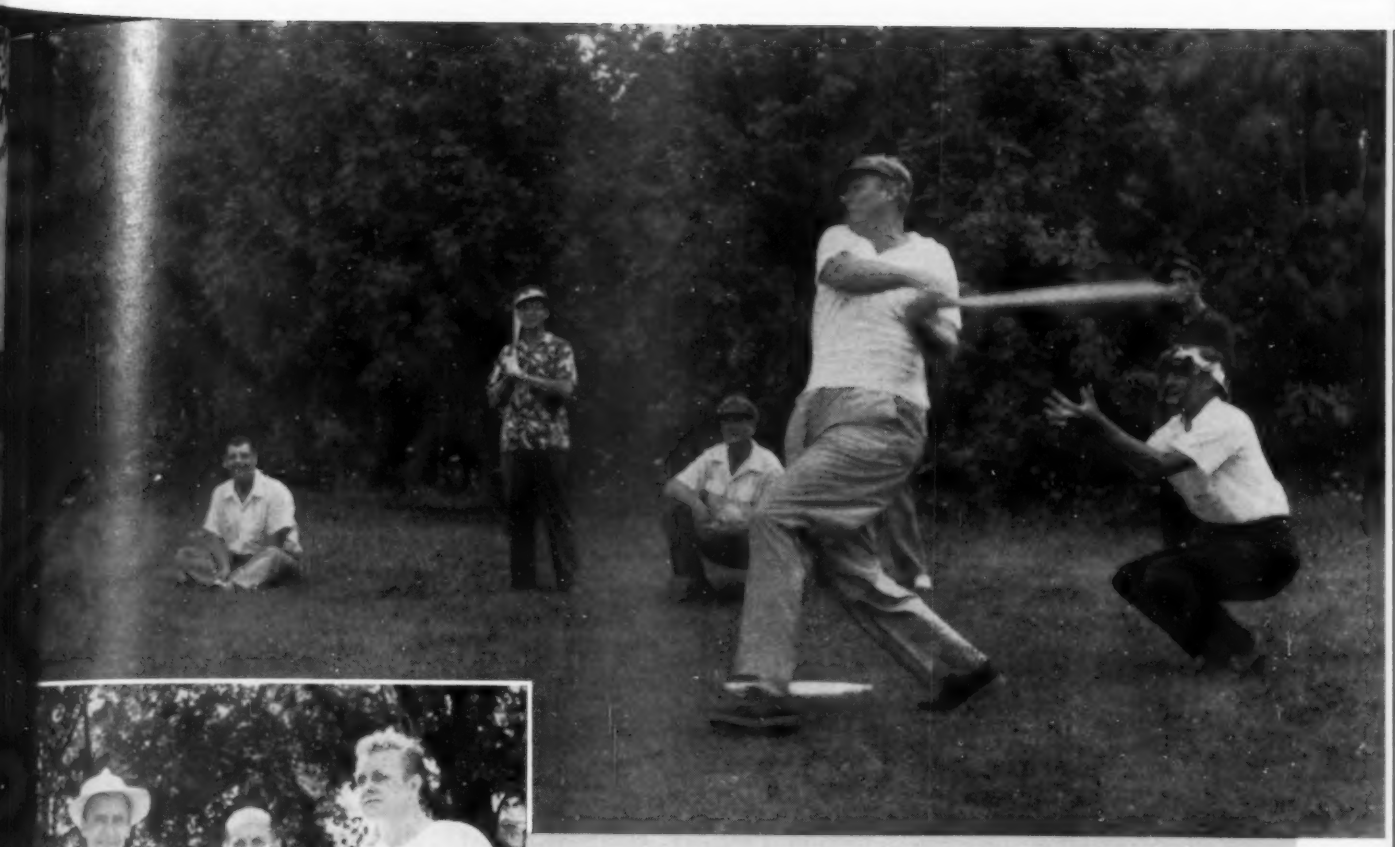
Chapters Wind Up Summer Activities



Fond du Lac's ASTE'ers held their annual outing on August 9 at Hickory Hills in Chilton. Many contests and a golf tournament were on the agenda for the men, while their wives played cards. Dinner was country-style ham and chicken.



After a full day of sports activities, officers of the Boston chapter gather at Green Acres Country Club, operations headquarters for their annual outing. From left: Walter



Detroit chapter's annual outing was held at Glen Oaks Country Club on August 15. From 6 a.m. until sundown, members participated in a full program of athletic activities. Here one of the baseball games is in full swing.



A golf foursome waits its turn to tee off at the Detroit outing. The over-sized driver in the foreground was ruled illegal by the judges and used only for clowning.



Nail driving is an art and has long been popular at ASTE picnics. These Detroiters take hammer in hand to see if they can prove their skill.

Subcommittee Formed by

Solar Aircraft Host to



After a full day of sports activities officers of the Boston chapter gathered at Green Acres Country Club, operations headquarters for their annual outing. From left: Walter B. Pohl, Thomas B. Walsh, Karl G. Nowak, Frank D. Clark, Charles L. Sadon, Wilfred B. Wells and Robert M. Marsh. —*Harry Midgley*

Golf and Softball Featured at Picnic

Jamestown, N. Y.—The Kendall Club on Chautauqua Lake was the scene of the annual stag picnic held by Chautauqua-Warren chapter. On August 21, some 130 members and guests gathered for a day of varied activities including a blind bogey golf tournament at Bemus Point Golf Club. Winners of the low net score in the tournament were William Hoff, first; Anthony DiMambro, second; and Richard Misener, third.

Another highlight of the day was the softball game between the Jamestown Pencil-Pushers and the Warren Slide-Rule Jockeys which ended in a 14-14 tie at the sound of the dinner bell.

Picnic committee chairmen were Paul E. Anderson, dinner; Floyd H. West, refreshments; Anthony DiMambro and Richard Freeman, golf tournament; Bob Putnam, Wesley Broadhead, and Leslie Beaujean, softball; and Gordon Carlson and Ray Samuelson, other sports. —*Laurence R. Green*

Philip Harvey Joins Technical Staff of ASTE

The most recent addition to ASTE's technical staff is Philip D. Harvey who has been appointed assistant technical director. Mr. Harvey will assist in the preparation of the new *Die Handbook* and later on revision of The *Tool Engineers Handbook.*



Philip D. Harvey, Assistant Technical Director

Before joining the Society headquarters staff, he was associated as a tool designer with Daystrom Instrument Division of Daystrom, Inc., Archbald, Pa. Prior to that he was in charge of a group of designers at Fairbanks, Morse & Co. at Beloit, Wis., and at Pullman Standard Car Mfg. Co. at Chicago.

Mr. Harvey took his university work at Northwest Missouri State College, Illinois Institute of Technology and California State College.

Tri-Chapter Meeting Scheduled for Baltimore

ASTE's autumn calendar will be highlighted October 3 when Baltimore, Central Pennsylvania and Greater Lancaster members hold a tri-chapter meeting at Baltimore. Special invitations to attend the event have been extended to Roger E. Waindle, national president of the Society, Thomas J. Donovan, Jr., a national director of ASTE; and Harry E. Conrad, ASTE executive secretary.

Munder's Laurville House will serve as headquarters for the event. An all-day tour of Bethlehem Steel's Baltimore plant and a dinner program are on the day's agenda. —*C. G. Kelley*

Dayton Chapter Awards $100 College Scholarship

This year's winner of the $100 scholarship award, made annually by the Dayton ASTE chapter, is Robert S. Swabb. Mr. Swabb is currently taking tool engineering courses at the evening school of Sinclair College. He is also employed as a tool designer at the National Cash Register Co. in Dayton.

—*William Killinger*

Position Wanted

MECHANICAL ENGINEER desires managerial position requiring application of mechanical and electronic backgrounds. For three years was chief engineer of contract metalworking plant employing 350 persons. Directed all engineering activities including design, production planning, process development, tool design and application, machine tool procurement and utilization.

Directed quality control and inspection department formulating methods and policies. Negotiated and directed performance of numerous prime and sub contracts of an ordnance nature.

Consulted with customers in connection with design, production and application problems.

Last 1½ years on active duty with U. S. Air Force in electronics work. Associated with operation and maintenance of radar and microwave equipment.

Am being separated from the service and will be available Oct. 30. Write to Box 15, The Tool Engineer, 10700 Puritan Ave., Detroit 21, Mich.

Positions Available

FACTORY SUPERVISOR—for plant, employing less than 35 persons, engaged in manufacturing name plates, badges and marking products. Man to have tool and die shop background. Write to Box 334, The Tool Engineer, 10700 Puritan Ave., Detroit 21, Mich.

TOOL AND MACHINE DESIGNERS—One of Cincinnati's largest permanent design firms has openings in their own office for experienced machine, product and tool designers, and detailers.

Recent engineering graduates or students will also be given consideration. These are permanent positions with a substantial, stable leader in the field. We can offer top starting wages, modern working conditions, paid holidays, vacations, and other benefits. Our policies assure varied experience and unusual opportunities with a future.

New employees would be expected to settle on a permanent basis in Cincinnati. Please send resume to Cincinnati Designing, Inc., 8120 Blue Ash Ave., Cincinnati 36, Ohio.

Recently Released Atom Films Viewed

Tour Air Line Maintenance Depot

Subcommittee Formed by ASTE Standard Group

D. C. Kauffman of Detroit has been elected chairman of the subcommittee on dimensional features of sintered carbides and carbide tools, which was established recently by ASTE's National Standards Committee.

Recommendations of Mr. Kauffman's committee, which is composed of producers and consumers of sintered carbides and carbide tools, will be presented for approval as an American standard by the Sectional Committee B5 of the American Standards Association.

Topics under discussion by the ASTE group includes the following: The need to establish additional shapes and sizes of turning tools; the need for additional sizes of carbide blanks; the standard for solid carbide inserts; the need for legible and durable marking on carbides; the existing standards and additional shapes of insert toolholders; a basic standard drawing of a milled and brazed tool; and a standard covering top overhang.

Annual Field Day Draws Large Crowd

Toronto—Some 200 members of the Toronto chapter gathered at the Uplands Golf Club for their annual field day. John R. Fitzpatrick, playing with two previous winners, Howard Lush and Harold Hillsdon, took top golfing honors and the Hiram Walker Trophy for his stroking skill. Horseshoes and baseball were also on the sports agenda and dinner was served in the clubhouse.

—A. McKinney Rice



Roy Drachman, left, member of the Tucson Chamber of Commerce and secretary of the ASTE chapter committee set up to help promote industrial activities, was the program speaker at a recent Tucson chapter meeting. He was introduced by James Beach, right, chairman of the chapter.

Tucson Chapter Aids Chamber of Commerce

Tucson—In cooperation with the Chamber of Commerce, the ASTE chapter in Tucson has formed a committee which will serve in an advisory capacity to promote industrial activities in that city.

At the August 11 dinner meeting, Roy Drachman, secretary for the project, and affiliated with the Chamber of Commerce, outlined the plan of action.

Mr. Drachman's speech was followed by a movie on carbide tipped cutting tools by Kearney & Trecker Corp. Special guest of the evening was Chester Vermillea, Phoenix chairman.

—Joseph W. Vincent

Solar Aircraft Host to West Coast Chapter

San Diego—The August 11 meeting of the San Diego chapter featured a dinner at the Langhorst Cafe and a subsequent technical session consisting of a plant tour to view the Mars Portable Gas Turbine Engine at Solar Aircraft Co., San Diego.

F. C. Heinig, chief field representative at Solar, was host and gave a talk and demonstration on Solar's Mars Gas Turbine pumping plant and the electric generator plant to the group assembled in Solar's auditorium.

—William Keller

No Summer Vacation for North Texas Committees

Although no technical programs were scheduled by North Texas ASTE members during the summer months, various chapter committees were deep in planning and organizational work.

Program Chairman Arnold E. Unruh was busy planning the coming year's program of technical sessions. Some of the subjects to be covered will be silicones, gaging, multipress forming, roll forming, jig boring, plastics, investment casting and atomic energy.

Results of the work of the North Texas membership committee are shown on the chapter's roster which now lists more members than ever before.

The education committee, under the leadership of L. I. MacDonald, began its program to help establish courses in tool engineering at two southwestern colleges.

—F. Paul Simpson





Although it may not appear that way, food was not the only attraction at the Houston ASTE chapter's annual family picnic held at the Clear Lake Home of the Billie Lloyds. Other activities included an outdoor program of swimming, sailing, fishing and horseshoe pitching. Among the many participants in this year's event were: John Engler, Mrs. George Freeman, Mr. Freeman, a past chairman of the chapter, and V. Richardson. *—M. M. Wiseman*

Directory of ASTE Chapter Chairmen and Meeting Nights

Recently Released Atom Films Viewed

Los Alamos—The August 12 meeting of the Los Alamos chapter featured a showing of three films on atomic power, a subject of keen interest to a population which realizes that this energy may influence or alter its way of life.

The showing took place in the Little Theater of Los Alamos High School. Members, wives and guests viewed "Target Nevada," "A-is for Atom," and "The Atom in Industry," recently released by the Atomic Energy Commission. —*H. J. Von Steeg*

Past Chairman Joins Ottawa Branch

Toronto—Fred Crook, past chairman of Toronto chapter, recently joined the staff of the A .R. Williams Machinery Co.'s Ottawa branch. He was transferred from the Toronto office, where he was assistant manager of the machine tool department.

Tour Air Line Maintenance Depot

San Francisco—Some 133 members and guests of Santa Clara Valley chapter toured the United Air Lines maintenance depot at the San Francisco airport on August 21. The tour was preceded by dinner in the United Air Lines cafeteria, a movie short on the DC-6, and talks by airline officials on depot operations.

The whole group was then broken up into parties of ten or twelve, each with a guide, to tour the depot.

The groups saw the giant ramps which fit snugly around each plane so it can be torn down and the parts handled and inspected on an assembly technique. They saw motors being torn down to their individual components and placed on a conveyor for cleaning operations. Further down the conveyor, the parts were picked off by the specialists who examined them for wear and replaced or repaired worn parts.

The groups also viewed the instrument division, the upholstery shop and the pilots' quarters, which proved of great interest. Special guests were Andy Rylander and Al Minetti, past chairman of Golden Gate chapter.

—*Glenn O. Herreman*



Andrew E. Rylander

West Coast News

By Andrew E. Rylander

Well, things should be moving along again after the summer recess, thereby giving me something to write about. Trouble with my letters, though, I'm bound to be behind no matter how far ahead I am, like right now I'm writing about August doings that won't get to you until October, which is now.

On the 18th, attended the Santa Clara Valley chapter meeting held at United Air Lines, South San Francisco, where a nice dinner was followed by a tour of the six-million dollar UAL maintenance plant. One should feel a lot safer up in the air after seeing the way they service and rebuild their planes.

A talk by Herbert A. Lebert, chief of methods and tool design, brought out ideas worth passing along. Whenever a new tool or fixture is designed, it is discussed with production foremen and the toolroom superintendent, the latter being invited to sign his name to the drawings. That way, everyone concerned has a feeling of responsibility for its successful operation.

In addition, production hands who use the tools and who may be confined to monotonous, repetitive work are not only informed on the reasons for design, but of the vital importance of the part they may be producing in the general aircraft assembly. Everybody being made to feel important makes for good teamwork or, as the French say, *esprit de corps*.

At a meeting of Golden Gate educational committee, an offhand remark about the Internat'l Corresp. Schools evoked a comment by one of the boys—Vern Gallichotte, I believe—that it would be a swell idea if the ICS were to offer a refresher course for professional engineers' exams. I wrote to W. J. (Bill) Williams, director of the School of Shop Practice, ICS, who replied, saying that they had such a course. To judge by outline of studies, it seems to offer everything needed and I'm passing the info along for the benefit of those who can't attend regular refresher classes.

Out sightseeing up toward the Oregon border; stopped at the Italian Swiss Winery at Asti, Calif., where I got firsthand insight into the tool engineering that goes into making a bottle of good wine. What a plant! There's acres of huge redwood tanks, some holding upward of 100,000 gallons, so you'd think you were walking through a grove of giant redwoods. Everything is mechanized and on a production basis except for the actual aging and blending. Visitors welcome, so stop in if you travel U.S. 101 in northern California.

Getting so that all roads lead to Walnut Creek—and the welcome mat is out! Had a nice visit from Carl and Mrs. Johnson from down San Gabriel way during the month. Carl, whose brother Ernie was out here earlier in the year, is direct factory representative for Reska Products, N. A. Woodworth and C. E. Johansson Gage Co., all of Detroit, so had a chance to get news of auld acquaintances in the Motor City. Thorugh Carl, I am grateful recipient of a limited edition biography of C. E. Johansson, "Master of Measurement," which will hold a treasured spot in my library.

A surprise visit from President Roger Waindle who, with his charming life partner and two children, detoured to Walnut Creek while on a transcontinental tour. While in the Bay Area, Roger had opportunity to get together with the officers of Golden Gate and Santa Clara Valley chapters and coming down from the Canadian Northwest, he met ASTE'ers in Seattle and Portland. There will always be a welcome for him and his if he ever wants to move out to the coast. I'd sure like him for a neighbor.

News in Metalworking

Directory of ASTE Chapter Chairmen and Meeting Nights

AKRON, Third Tuesday, F. A. Flannery, 241 Edgerton Rd., Akron, Ohio

ALBUQUERQUE, First Friday, H. P. Baecker, 1721 Ridgecrest Dr., Albuquerque, N.M.

ATLANTA, Third Monday, C. D. Toney, Jr., 774 Dill Ave., S.W., Atlanta, Ga.

BALTIMORE, First Wednesday, D. E. Wernz, 1214 Regester Ave., Baltimore 12, Md.

BINGHAMTON, First Wednesday, H. D. Bertholf, 46 Matthews St., Binghamton, N.Y.

BOSTON, Second Thursday, W. B. Wells, 94 Walnut Hill Rd., Chestnut Hill 67, Mass.

BUFFALO-NIAGARA, Second Thursday, W. J. Iekel, R.F.D. 1, Springville, N.Y.

CANTON, Fourth Tuesday, C. H. Smith, 602 9th St., N.W., Canton, Ohio

CEDAR RAPIDS, Third Wednesday, R. L. Coyner, 119 Rapids Ave., S. W., Cedar Rapids, Iowa

CENTRAL PENNSYLVANIA, First Wednesday, R. H. Meckley, R.F.D. 1, Red Lion, Pa.

CHAUTAUQUA-WARREN, Third Thursday, R. J. Wilson, Jr., Sylvania Prod. Co., Warren, Pa.

CHICAGO, First Monday, H. A. Paine, Federal Machine Sales, 4639 Washington Blvd., Chicago 44, Ill.

CINCINNATI, Second Tuesday, R. B. Niebusch, 3921 Woodford Rd., Cincinnati 13, Ohio

CLEVELAND, Second Friday, G. W. Carlton, 1910 Seneca Dr., Euclid 17, Ohio

COLUMBUS, Second Wednesday, E. A. Bartlow, 2080 Riverside Dr., Columbus 12, Ohio

DAYTON, Second Monday, R. A. Miller, Economy Tool & Die, P.O. Box 127, Dayton 10, Ohio

DECATUR, Next to last Thursday, Robert Serr, Forrest Knolls Est., Decatur, Ill.

DENVER, First Thursday, C. J. Helton, 61 S. Cherokee, Denver 9, Colo.

DES MOINES, Third Wednesday, G. F. McMaster, 304 Hillside, W., Des Moines, Iowa

DETROIT, Second Thursday, Michael Pinto, Douglas Tool Co., 3437 Goldner Ave., Detroit 10, Mich.

ELMIRA, First Wednesday after second Tuesday, E. C. Bates, 111 Oakwood Ave., Elmira Hts., N.Y.

ERIE, First Tuesday, H. M. Rudd, 2717 Cascade St., Erie, Pa.

EVANSVILLE, Second Monday, P. W. Vierling, Benerson Corp., 418-424 N. Willow Rd., Evansville 20, Ind.

FAIRFIELD COUNTY, First Wednesday, R. W. Smith, 141 Edgehill Rd., Fairfield, Conn.

FOND DU LAC, Second Friday, E. J. Kaiser, 530 E. Division St., Fond du Lac, Wis.

FORT WAYNE, Second Wednesday, D. D. Welbaum, 2318 Wayne-Wood Dr., Ft. Wayne 6, Ind.

FOX RIVER VALLEY, First Tuesday, P. C. Shaner, 203 N. Washington, Batavia, Ill.

GOLDEN GATE, Third Wednesday, D. A. Gustafson, 2765 Argyle St., Oakland 2, Calif.

GRAND RIVER VALLEY, First Friday, John Ward, Can. General Tower, 52 Middleton St., Galt, Ont., Can.

GRANITE STATE, Second Tuesday, J. J. Repetto, Clarostat Mfg. Co., Washington St., Dover, N.H.

GREATER LANCASTER, Second Tuesday, R. C. Moorhead, 1912 Sterling Pl., Lancaster, Pa.

GREATER NEW YORK, First Monday, H. W. Barclay, New York Times, 229 W. 43rd St., New York, N.Y.

HAMILTON, Second Friday, C. E. Bulmer, 43 Whitton Rd., Hamilton, Ont., Can.

HARTFORD, First Monday, O. A. Gingras, Pratt & Whitney Div., West Hartford, Conn.

HOUSTON, Second Tuesday, H. O. Traughber, 302 Norwood, Houston 11, Tex.

INDIANAPOLIS, First Thursday, Joe Penn, 526 Mills Ave., Indianapolis 27, Ind.

JACKSON, Third Monday, Theodore Vickers, 726 Griswold St., Jackson, Mich.

KANSAS CITY, First Wednesday, M. R. Grundy, 2600 Somerset Dr., Kansas City 5, Mo.

KEYSTONE, First Thursday, Jack Lipman, 439 Irving Ave., N., Scranton, Pa.

KNOXVILLE-OAK RIDGE, M. B. Hilton, Lester Rd., Rte. 10, Knoxville, Tenn.

LACROSSE, Fourth Tuesday, E. J. Giroux, 1035 S. 19th St., La Crosse, Wis.

LANSING, Fourth Monday, R. F. Gietzel, Rte. 2, Box 380, Lansing, Mich.

LEHIGH VALLEY, Third Friday, J. D. Folwell, 614 N. St. Elmo, Allentown, Pa.

LIMA, Third Thursday, A. E. Feightner, R.F.D. No. 1, Elida, Ohio

LITTLE RHODY, First Thursday, F. W. Kunath, 29 Taylor St., Cranston, R. I.

LONDON-ST. THOMAS DISTRICT, Third Thursday, Louis Jensen, Kelco Eng., Ltd., 352 Thames St., London, Ont., Can.

LONG BEACH, Second Wednesday, C. E. Blanchard, 5760 Appian Way, Long Beach 3, Calif.

LONG ISLAND, Second Monday, Arthur Cervenka, Vanderbilt Blvd., Oakdale, L. I., N. Y.

LOS ALAMOS, First Wednesday after second Tuesday, R. H. Moller, 2146A 43rd St., Los Alamos, N. M.

LOS ANGELES, Second Thursday, C. L. Almquist, Almquist Bros., 2300 E. 49th St., Los Angeles 58, Calif.

LOUIS JOLIET, Third Tuesday, H. J. Moffat, Caterpillar Tractor Co., Joliet, Ill.

LOUISVILLE, Second Tuesday, R. F. Lenz, 3127 Eagle Pass, Louisville 13, Ky.

MADISON, Third Thursday, E. C. Helmke, Gisholt Mach. Co., 1200 E. Washington, Madison 10, Wis.

MEMPHIS, Second Friday, A. T. Hicks, Hays Machine Tool Co., 269 So. Front, Memphis, Tenn.

MID-HUDSON, Second Tuesday, S. P. Cook, Vassar View Rd., Poughkeepsie, N. Y.

MILWAUKEE, Second Thursday, E. J. Anspach, Line Material Co., 700 W. Michigan St., Milwaukee 2, Wis.

MOHAWK VALLEY, Fourth Tuesday, E. K. Wheat, 301 Otsego St., Ilion, N. Y.

MONTREAL, Second Thursday, C. A. Gareau, 1080 Crevier Ville, St. Laurent, Que., Can.

MUNCIE, First Tuesday, N. E. Hines, 2106½ So. Washington St., Marion, Ind.

NASHVILLE, Third Tuesday, W. A. Thornberry, General Machine Co., 715 12th Ave., So., Nashville 4, Tenn.

NEBRASKA, Third Thursday, J. A. Duncanson, P. O. Box 148, Seward, Neb.

NEW HAVEN, Second Thursday, E. E. Lull, Crucible Steel Co., 131 Park St., New Haven, Conn.

NEW ORLEANS, First Tuesday, L. B. Graham, 4994 Montegue, New Orleans, La.

NIAGARA DISTRICT, First Thursday, A. A. Clarkson, 154 S. Dr., St. Catharines, Ont., Can.

NORTHERN MASSACHUSETTS, Third Tuesday, G. H. Stimson, Greenfield Tap & Die Co., Sanderson St., Greenfield, Mass.

NORTH TEXAS, Second Friday, J. E. Franklin, 705 N. W. 9th St., Grand Prairie, Tex.

NORTHERN NEW JERSEY, Second Tuesday, W. E. Wheaton, 915 W. 6th St., Plainfield, N. J.

PATERSON, C. M. Bazaz, 272 Maryland Ave., Paterson, N. J.

PEORIA, First Tuesday, R. J. Zimmerman, Box 91, Roanoke, Ill.

PETERBOROUGH, First Thursday, Leendert Hansler, 624 Donegal St., Peterborough, Ont., Can.

PHILADELPHIA, Third Thursday, C. R. Pittsinger, 210 Montgomery Ave., Oreland, Pa.

PHOENIX, First Monday, C. W. Vermilyea, Motorola Research Lab., Phoenix, Ariz.

PIEDMONT, Second Monday, E. N. Dietler, Crucible Steel Co., P. O. Box 2402, Charlotte, N. C.

PITTSBURGH, First Friday, L. J. Brozek, 2508 Collins Rd., Pittsburgh 35, Pa.

PONTIAC, Third Monday, H. V. Phipps, Cutting Tool Supplies, 88 S. Cass Ave., Pontiac, Mich.

PORTLAND, ME., Second Friday, F. B. Taylor, 18 Birch Ln., R.F.D. 4, Portland, Me.

PORTLAND, ORE., Third Thursday, M. S. Nielsen, 9043 N. W. Leahy Rd., Portland 1, Ore.

POTOMAC, First Thursday, G. M. Beck, 7917 Kentbury Dr., Bethesda, Md.

RACINE, First Monday, W. E. Swan, Racine Tool & Machine Co., 1760 State St., Racine, Wis.

RICHMOND, Second Tuesday, R.H. Culbertson, 11 S.W. 5th, Richmond, Ind.

ROCHESTER, First Monday, D. F. Kohler, 240 Vanvoorhis Ave., Rochester 17, N. Y.

ROCKFORD, Second Thursday, William Moreland, 3304 Minnesota Ave., Rockford, Ill.

SAGINAW VALLEY, Third Thursday, D. A. McMillan, 3316 Court St., Saginaw, Mich.

ST. LOUIS, First Thursday, W. J. Potthoff, Rte. 2, Box 64, Graeser Rd., Creve Coeur, Mo.

SALT LAKE CITY, Second Friday after first Wednesday, Frederick Preator, 530 N. Third, East Logan, Utah.

SAN DIEGO, Second Tuesday, A. E. Crom, 1759 Oliver Ave., San Diego 9, Calif.

SAN FERNANDO VALLEY, First Wednesday, Rudolph Regen, 4523 Fulton Ave., Sherman Oaks, Cal.

SAN GABRIEL VALLEY, First Thursday, Peter Carter, Rain Bird Sprinkler Mfg. Corp., 19233 E. Foothill, Glendora, Calif.

SANTA CLARA VALLEY, Third Tuesday, W. C. Lanyon, 104 Oak Hill Way, Los Gatos, Calif.

SCHENECTADY, Second Thursday, G. S. Nelson, 315 Florida Ave., Amsterdam, N. Y.

SEATTLE, Fourth Tuesday, R. A. Coady, 6559 43rd Ave., N. E., Seattle 5, Wash.

SOUTH BEND, Second Tuesday, J. L. Kemp, 909 Sherman, South Bend 16, Ind.

SPRINGFIELD, ILL., First Tuesday, E. J. Kane, 200 S. MacArthur Blvd., Springfield, Ill.

SPRINGFIELD, MASS., Second Monday, R. M. Dickson, 29 Maybrook Rd., Springfield 9, Mass.

SPRINGFIELD, OHIO, Second Tuesday, R. C. Montanus, Signal Hill Rd., Springfield, Ohio.

SYRACUSE, Second Tuesday, R. D. Fulford, 309 Melrose Ave., Syracuse 6, N. Y.

TOLEDO, Second and Fourth Wednesday, J. J. Kertz, 4554 Willys Parkway, Toledo 12, Ohio.

TORONTO, First Wednesday, D. R. J. Few, 85 Northline Rd., Toronto, Ont., Can.

TRI-CITIES, Second Wednesday, G. H. Jording, 2015 42nd St., Rock Island, Ill.

TUCSON, Second Tuesday, J. D. Beach, 5828 Nogales Hwy., Tucson 2, Ariz.

TULSA, Second Thursday, L. W. Williams, 717 So. Marion, Tulsa, Okla.

TWIN CITIES, First Wednesday, C. E. Fasth, 2700 29th Ave., N. E., Minneapolis 18, Minn.

TWIN STATES, Second Wednesday, George Julien, 26 Smith St., Springfield, Vt.

WATERLOO AREA, Third Wednesday, G. E. Osworth, Tecumseh Products, Tecumseh, Mich.

WESTERN MICHIGAN, Second Monday, H. J. Swanson, Swanson Machine, 1422 Lake Dr., S.E., Grand Rapids 6, Mich.

WICHITA, Second Wednesday, A. A. Reddy, 430 S. Vine, Wichita, Kan.

WILLIAMSPORT, Second Monday, W. J. McCoy, 316 E. Central Ave., S. Williamsport, Pa.

WINDSOR, Second Monday, J. F. Johnston, 30 Thomson Blvd., Riverside, Ont., Can.

WORCESTER, First Tuesday, J. E. Rotchford, Lodding, Inc., 73 Beacon, Worcester 2, Mass.

the radiant ... es. Actually, the furnace ... production speed ... ONE Brehm Die

News in Metalworking . . .

AUTOMATIC HEAT-TREAT OPERATION STREAMLINES FASTENER HANDLING

Up to 50,000 screws an hour are now being heat treated in the hardening room of Standard Pressed Steel Co. through an automatic production line setup 110 feet long, yet capable of handling threaded fasteners with a jeweler's precision.

Socket screws take a two-hour nonstop metallurgical trip through seven separate operations in this mechanical giant.

All operations, which include weighing, first wash, hardening, quench, second wash, tempering and rustproofing, are timed and tied together by a series of powered belts and shaker conveyors. Thus from the time C bin loads of screws are dropped by fork truck on the weigh scale until the screws are again returned to the C bins after rustproofing at the far end of the line, all handling is completely automatic.

The entire line is built around a 30-foot long radiant tube hardening furnace and a special gas-cracking unit that provides a precisely controlled inert atmosphere for the heat-treating process. Cost of the new setup approached $200,000.

On the basis of a week's trial run, the equipment is estimated to maintain production at the rate of 1000-1400 pounds of screws per hour, depending on the size of the fastener being processed. This is about three times the capacity of SPS' largest previous heat-treating line.

The new line, designed and installed by Surface Combustion Corp., can heat treat more than half the plant's production of Unbrako standards and specialty aircraft fasteners. A second such line which is now under consideration would enable SPS to channel all its standard fastener production through these automatic mazes.

Though designed primarily for large scale runs on standard items, the new equipment can economically process large or small batches of any type threaded fastener—switch from one product to another and back with minimum lost production time.

Excellent precision in both handling and heat treating is an additional advantage of this mechanized heat treater.

Engineers of SPS and Surface Combustion carefully planned the flow of product and the sequence of conveyors, shakers and gravity drops to prevent nicking of threads and marring of surface finishes.

Precision in heat-treating is promoted by the auxiliary gas-cracking unit that supplies an inert atmosphere to the hardening furnace. Propane gas is pumped into the gas-cracker, which returns an inert gas of precisely controlled temperature and composition. This constant atmosphere permits SPS to control with pinpoint accuracy the hardness of its fasteners and the quality of the finish.

Thus, the gas-cracker prevents scale formation and decarburization. Through a few simple adjustments, the cracker can be set to supply the exact amount of carbon recovery desired. Actually, with the gas-cracker, the hardening furnace can be operated as a carburizer—adding controlled amounts of carbon to the case of the screw to build up a hard shell around a relatively mild steel.

Screws come to the new automatic hardening line in C bins from nearby machining areas. The bins are identified and segregated in a small storage area at the beginning of the production run where they remain until dispatched through the heat-treat line.

The operator at the beginning of the hardening line picks up the bins by overhead chain hoist, drops them—one by one—on a counting scale. This scale is so calibrated that when the operator places fifty of a lot of screws into the balance pan, the scale dial indicates directly the number of screws in the lot.

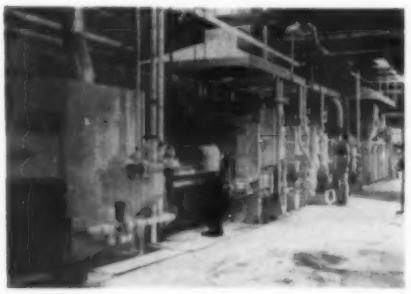
The count is immediately sent to the shipping department so that an order for the particular lot of fasteners can be pulled and processed while the lot is being heat treated. (Plans include eventual installation of scribing stations both at the weigh station and in shipping to transmit this information.) As a result a batch of screws may be shipped to a customer just as soon as the lot leaves the heat-treat line.

With the weighing finished, an hydraulic tilt-stand next dumps the screws directly from the weigh stand into a short section of shaker conveyor.

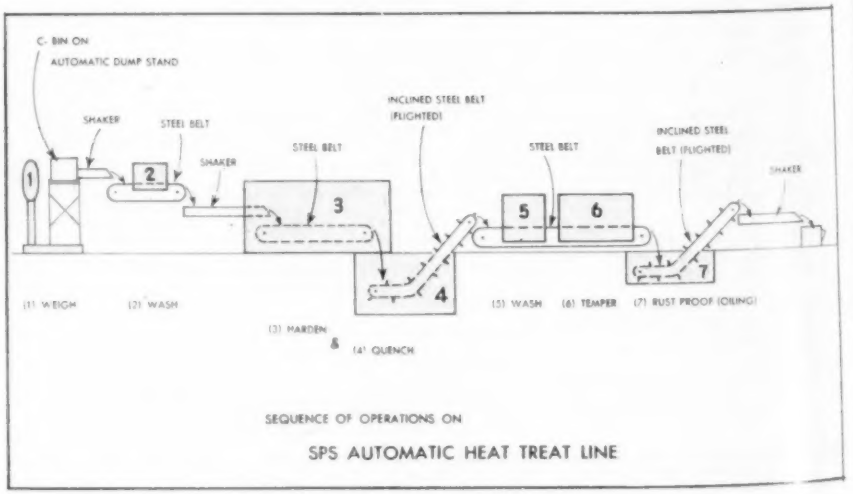
The shaker feeds the first wash. Here, on a steel belt, the screws ride through a hot alkali rinse that strips them of accumulated oil, grime and dirt.

The cleaned screws drop out of the wash onto a steel-trough shaker conveyor which carries the screws into the hardening furnace and onto the steel belt that runs the entire length of the 30-foot chamber.

In the hardening furnace (radiant-tube type) the screws are brought into perfect solution at a temperature of about 1600 F. The controlled atmosphere that fills the furnace excludes oxygen, other reactive elements, and prevents decarburization and scaling—the heating gases themselves flow inside



This automatic furnace line stretches more than one-third the length of a football field. Dominating the line are the first wash (left), precision heat treat furnace (center) and the tempering oven (far right). At right, diagram indicates the orderly sequence of operations on the line.



SEQUENCE OF OPERATIONS ON
SPS AUTOMATIC HEAT TREAT LINE

than bar stock. An automatic oiler replaces hand-swabbing to lubricate stock as it enters the press. Feed through

body casting for the film opening and film counter sprocket. These also are now part of the casting.

the radiant tubes. Actually, the furnace is running now at top production speed with desired carbon recovery.

At the end of the heat treating, the parts drop rapidly into an eight-foot deep quench pit. Rapid quenching at critical temperature by a special-type oil assures fine grain steel of high hardness. Over five thousand gallons of quenching oil is recirculated through a cooling tower on the plant roof. The oil re-enters the quench tank through powerful jets that thoroughly agitate the oil and provide an even quench.

A flighted, inclined steel belt conveyor pulls the quenched parts from the pit, drops them on a woven steel belt conveyor that feeds in sequence the second wash and the tempering oven.

The second wash removes quench oil, the tempering oven lowers screw hardness from about 50 Rockwell (achieved through heat treating) to any level.

Tempering, which is the longest single operation, generally controls the speed of the production line. From 30 to 45 minutes is required to temper SPS standards, a minimum of one hour for aircraft specialty parts.

At the end of the tempering oven, the screws again drop into an oil-filled pit—this time a shallower pit for oil-proofing the finished product. A flighted, inclined steel belt conveyor pulls out the rust-proofed screws and drops them on a vibrating screen conveyor, shakes out excess oil, and deposits a finished product into waiting C bins at the end of the line.

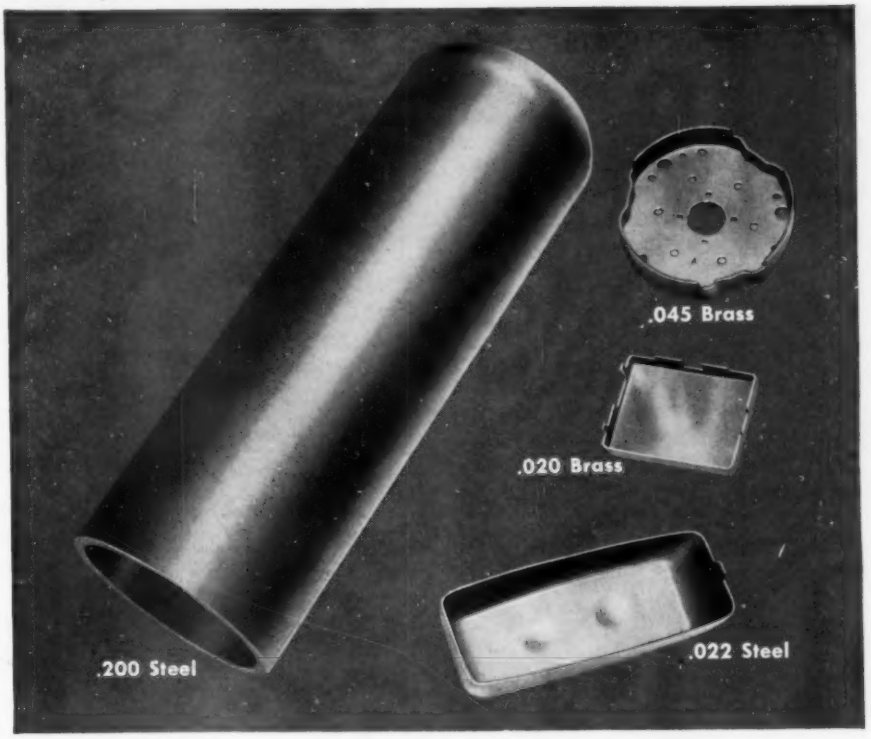
Installation of the mechanized line is part of a $10,000,000 expansion program which in the past three years has modernized and enlarged facilities for the production of all the company's major products.

PRODUCTION IMPROVEMENTS LESSEN COST

A re-evaluation of company operations involving production methods and alterations in design as well as some changes in equipment brought about a 10-percent reduction in retail price of the product. The item in question is a camera manufactured by Argus Cameras, Inc., who offers the experience as concrete evidence of the value of continuous production study.

In equipment, a new automatic Bliss press doubled production capacity on camera shutter leaves which had been previously stamped out on three machines with three five-station progressive dies and operators. In addition, the old machines had to be stopped every time a new eight-foot length of stock was fed in. The new replacement can function at maximum speed almost continuously; it has a stock straightener, making possible use of coiled rather

ONE Brehm Die
using various cutting adapters



Reduces Original Cost . . . Cuts Operating Costs!

When model or part changes interrupt production, only the cutting adapters of a Brehm Die need to be replaced to continue full production. Don't overlook the fact that a single Brehm Die, using various cutting adapters, greatly reduces the original investment, to say nothing of reducing current operating costs.

The Brehm "Shimmy" Die has angular cams which cause the shearing edges to cut four ways in a single press stroke. Higher production and lower costs are possible because "pinch" and slow, costly "horn" trimming operations are eliminated. Materials, thicknesses, shapes and sizes can vary. Such as gold, silver, plastic, rubber, aluminum, copper, brass, zinc, stainless or mild steel. A refrigerator door, the case of a lady's watch, an artillery case, a business machine, aircraft or automotive part.

Perfect edges, clean, without burrs or distortion at the trimmed edge. Contours can be straight or curved, with single or multiple notches and projections.

For a free Brehm Die Catalog, write today. If you wish, and without obligation, send us your blueprint or the part for complete information or quotation.

THE "SHIMMY" REG. DIE ®

Brehm
TRIMMING DIES

THE STEEL PRODUCTS ENGINEERING CO.

BREHM DIE DIV., DEPT. 19 SPRINGFIELD, OHIO

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-101

than bar stock. An automatic oiler replaces hand-swabbing to lubricate stock as it enters the press. Feed through the stations is automatic. With these innovations, a single operator can tend two machines.

Simple design changes also helped improve quality and decrease costs. Shafts for the wind and rewind knobs on the camera had been brass bushings, riveted onto the case. Today a mold makes these knobs an integral part of the casting, eliminating one production operation, an assembly operation, and strengthens the camera.

Two machining operations were needed to mill out three holes in the body casting for the film opening and film counter sprocket. These also are now part of the casting.

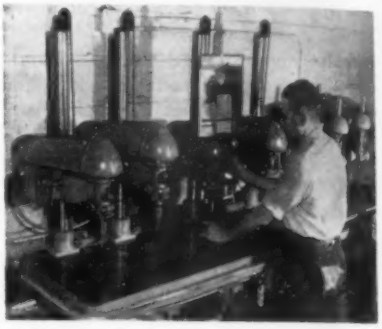
Precision steel casting eliminates the complex machining and deburring work formerly required to mill from a solid piece the intricately dimensioned copper-plated power shaft which operates the shutter through a cam on the shaft.

The precision thread necessary on the focusing mount to prevent slope was formerly a hand job. Now a Cridan machine cuts precision threads exactly to finish size, improving quality and reducing cost.

Changes in methods for making lenses added to the economy. Three



Above, an operator moves along a line of drill presses to drill 38 holes individually in a single camera case. Below, the same job is accomplished in a fraction of the time by an eccentric plate-operated drill.



lens elements involved must be ground and polished on both sides to most exacting tolerances; thus, six precise operations for each camera. To fix the lenses for work, they are mounted on pitch-covered metal fixtures in a process called blocking. The pitch must be heated to melting temperature each time a lens is affixed or removed from the block, or 12 times for each camera. Formerly, the block was heated on a hot plate to the proper temperature, according to operator judgment. Today, an induction heating process produces molten pitch almost instantaneously besides reaching an exact stage of melting for efficient operation.

Still another economy revolves around drilling 38 holes in each case. Formerly they were done in a lengthy process by a row of 14 drill presses, the operator moving up and down the line drilling each hole separately, changing spindles for the necessary sizes. Multiple-spindle machines operated by eccentric plates not only eliminate the involved practice, but make it possible to drill the holes closer together than ever before. Four drilling operations now take the place of the 38. Other small method and design changes contribute even further to time and cost reduction, easier assembly, fewer rejects and less need for inspection with the result of improved quality and fewer changes of faulty parts reaching assembly.

A SHARP POINT EVERYTIME!



Hammond of KALAMAZOO

CARBIDE TOOL GRINDERS

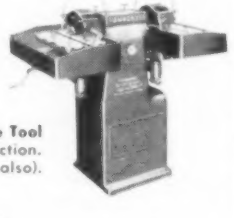


Ask any user of the MORE THAN 6,000 HAMMOND CARBIDE TOOL GRINDERS now in service — "point by point" all the way through — these machines are precision built for efficient trouble-free grinding of CARBIDE AND HIGH SPEED STEEL TOOLS.

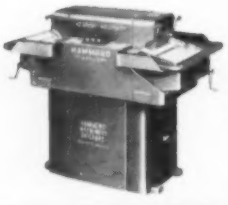
There's no substitute for experience, and Hammond has been building dependable machinery for more than 70 years!

Write for Catalog A-225

Model CB-77 Chip Breaker and Diamond Finishing Grinder for handling box and single point tools. (Model CB-77W for wet grinding also available).



Model WD-10 Wet or Dri 10" Carbide Tool Grinder with double cup wheel construction. (Available with straight and cup wheel also).



Model 14-WD Wet or Dri 14" Carbide Tool Grinder. Designed for production grinding of medium and large size tools. Will quickly pay for itself in longer tool life, wheel economy, and faster grinding.

"Good Machinery Since '82"

Hammond Machinery Builders INC.

1661 DOUGLAS AVENUE • KALAMAZOO, MICHIGAN

"SEE US AT BOOTH 1150 — NATIONAL METAL EXPOSITION

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-102

Tools of Today . . . .

Multiple Welder

In the field of electrical resistance welding, Sciaky Bros., Inc., 4915 W. 67th St., Chicago, has introduced a unit called the SX 36 G which they suggest as an answer to the problem of designing special machines for multiple gun applications in production.

The standard universal multiple gun base has two individually operating platen units. These are loaded in the extended position, then swing in and lift to the welding position. On completion of the welding sequence, they retract and swing out for unloading.

The platens, 18 x 24 inches, receive the dies necessary for a specific application, and in the extended position are easy to load and unload. Because of the vertical retraction feature of the platen from the welding position, a wide variety of deep-drawn piece parts can be welded. In production, the platen units can be operated individually, or they can function simultaneously through only the lifting and retracting sequences. The feature of simultaneous operation in those sequences permits long piece parts to be passed through the middle of the machine to accomplish large weld patterns in one operation.

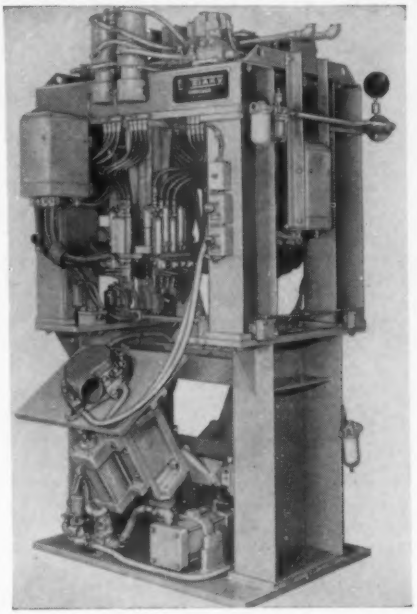
Construction of the standard base includes two fabricated steel columns mounted on a flat plate. The crown plate at the top of each column is machined flat and parallel to the base plate, and is drilled and tapped to receive special superstructure designed for specific applications. Platen and guide assemblies are trunnion mounted to the side columns and swung into vertical position and lifted to the welding position by two pneumatic cylinders.

Two air-operated shot pins lock each platen in the "up" position. These locking pins automatically disengage at the end of the welding cycle, and the platen assembly retracts and returns to the welding position.

Design of the Sciaky standard base makes easy the attachment of special superstructure for support and location of transformers, welding guns and a hydropneumatic booster to suit the configurations of particular welding applications. These components can be rearranged to fit any other application within the capacity of the base unit.

Several other practical advantages are incorporated in the unit make-up.

The SX 36 G unit is simple and fast to operate in production and all welding controls are preset. After the piece parts have been lifted on the dies



mounted to the work platen, the operator presses two palm buttons at each side of the superstructure. The base pivot unit swings the work platen in and up to welding position, where it is locked in by two shot pins. Movement of the shot pins contacts two limit switches, initiating the welding gun pressure and starting the welding sequence of "squeeze," "weld," "hold," and "platen delay," which allows the welding guns to retract. The platen then retracts and swings out to the unloading position.

An illustrated descriptive brochure about the SX 36 G unit is available from the company. **T-10-1031**

USE READER SERVICE CARD ON PAGE 105 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

Tube Expanding Machine

A vertical tube expanding machine, first in a line of hydraulic powered machines for expanding and sizing metal tubing, has been placed on the market by Walter P. Hill, Inc., 22183 Telegraph Rd., Detroit 19.

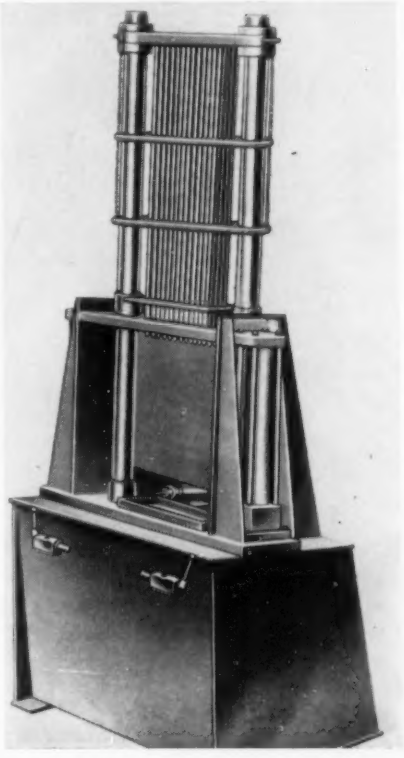
The vertical machine is a manually controlled type, particularly adapted to the expansion and sizing of copper tubing in evaporator and condenser coil assemblies.

In operation, the evaporator tubing and fin assembly is placed in a fixture on the machine table and hydraulically clamped in position by actuating the left hand hydraulic control valve. The right hand control valve is then actuated, causing the mandrel to feed to depth, thus expanding and sizing the tubes. At the end of the down-feed, the right hand control valve is reversed, causing the mandrel assembly to withdraw from the tubing and return to the top of the stroke.

Two hydraulic cylinders in the base of the machine control the mandrel feed and return functions through two draw rods. The expanding mandrels have hardened steel bullet noses and are supported by retaining plates that are guided on the draw rods and stack up as the mandrels are fed to depth. The shorter sizing mandrels are supported by a mounting plate that is also guided on the draw rods.

The model illustrated has expansion mandrels mounted on one-inch centers. These mandrels expand sixty 3/8-inch diameter copper tubes 0.020-inch in an evaporator assembly to provide thermal-conducting, mechanical joints between the tubing and a stack of cooling fins.

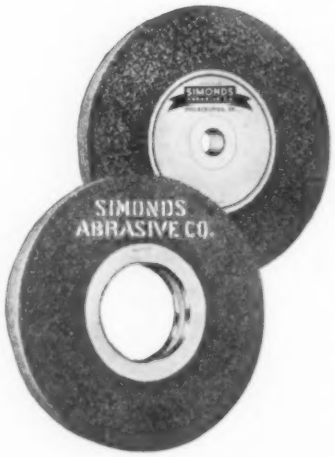
Another set of 60 mandrels, through which the expanding mandrels feed, are picked up near the end of the down-feed to size the ends of the tubing for soldered return bend fittings by expanding them an additional 0.026 inch. **L-10-1032**



"S.F.P.M." means something else too!



SIMONDS ABRASIVE CO.
Grinding Wheels



As you know, the letters "s.f.p.m." stand for surface feet per minute. For you, "S.F.P.M." can also mean "Simonds for production maximum" with Simonds Resinoid and Vitrified bonded grinding wheels. And this is proven productivity . . . consistently shown in field surveys of industrial plants where Simonds wheels are used. Put these proven producers to work on your high speed and low speed grinding jobs. They're part of Simonds' complete line including grinding wheels, mounted wheels and points, segments and abrasive grain . . . all accurately specified to meet your job needs exactly.

Write for data book and name of your Simonds Distributor.

SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON

DISTRIBUTORS IN PRINCIPAL CITIES

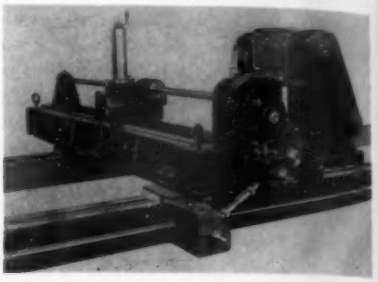
Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N.Y. Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-104

Milling and Facing Machine

Heavy-duty precision milling and facing on jobs too large, or so situated as to make their removal to the machine shop impractical, can now be done by taking the Forney portable universal milling and facing machine to the job. It can be depended on to function with both speed and precision, the manufacturer states.

The machine's uses extend into many



fields. It resurfaces hammer bases in forge plants or may be used for work on motor bases, bed plates and similar components.

Spindle speeds range from 9 to 72 rpm, and cutters from 3 to 15 inches in diameter can be used. Any surface angle can be maintained and surfaces up to 84 inches in width can be accurately milled. Longitudinal travel rails of any length can be furnished.

More details are available in Bulletin No. 104, Forney's, Inc., P. O. Box 310, New Castle, Pa. **T-10-1041**

Tempered Steel Drill

The Tempered Steel Drill Co., 3610 Superior Ave., Cleveland, has announced an improved drill for drilling hardened steel as hard as 68 Rockwell without annealing. Among the improvements of the drill are the 3 wide lands which keep the drill from floating and which eliminate the possibility of oversize holes, due to the greater bearing surface. Another improvement is the heavy center section that overcomes drill breakage, due to the pressure required when drilling hardened steel.

Any standard drill press can be used in drilling hardened parts with a tempered steel drill. Just insert the drill in the chuck, adjust the belt for the proper speed and start drilling.

In die and jig work, where parts ordinarily would have to be annealed or in some cases rejected after drilling, parts can now be drilled without annealing. It is also practical to use tempered steel drills for countersinking, reaming, or enlarging drilled holes in hardened steel, finishing the holes right to size. **T-10-1042**

THE TOOL ENGINEER'S

THE TOOL ENGINEER'S *Service Bureau*

TRADE LITERATURE CURRENTLY OFFERED BY THE TOOL ENGINEER ADVERTISERS

LITERATURE NUMBER	COMPANY	DESCRIPTION
A-10-256-1	Acme Industrial Co.	**Bushings**—New Acme bushing catalog features 2 standards—ASA Standard plus Acme Standard. Simplifies, speeds bushing selection. Filled with valuable data. (Page 256)
A-10-240	Allegheny Ludlum Steel Corp.	**Swaging Dies**—New catalog, "Forging and Casting Products" offers full details on FCC Air hardening, oil hardening and other cast-to-shape tool steel specialties. Also composite die sections and smooth-hammered forgings in a wide range of tool and stainless steels. (Page 240)
A-10-156	F. E. Anderson Oil Co.	**Coolant**—Free book, "Lusol" gives case histories of how Lusol's rapid cooling permits much higher-speed machining and boosts efficiency of workers. (Page 156)
A-10-181	The Carborundum Co.	**Grinding Wheels**—Booklet, "Center Type Cylindrical Grinding" tells how to choose the right grinding wheel to improve quality, boost production and cut costs. Also available is Catalog No. 50, "Grinding Wheel Selector." (Page 180-181)
A-10-155	The Cleveland Tapping Machine Co.	**Tapping Machines**—Catalog TL-104 offers solution of production problems. Also available—"Production Tapping Guide." (Page 155)
A-10-213	Consolidated Machine Tool Corp.	**Threading Die Heads**—Bulletin No. M-124 gives information on modern stationary type self-opening die heads and other modern precision tools, for accurate, fast, economical thread cutting. (Page 213)
A-10-283	The Cushman Chuck Co.	**Power Wrenches**—Bulletin No. 211-D explains special applications in the use of Cushman Electric power wrenches on Multi-spindle machines. Torque at the wrench end can be predetermined and maintained at desired values. (Page 283)
A-10-185	DeVlieg Machine Co.	**Boring and Milling Machines**—New catalog gives information on typical examples of jigless productions with the Jigmill technique, special machinery, and tool and experimental work. (Page 185)
A-10-142	Engis Equipment Co.	**Diamond Compounds**—Technical bulletin No. T-1053 explains how fast, free-cutting action is assured by use of pure Hyprez Diamond Compounds. (Page 142)
A-10-126	Erickson Tool Co.	**Chucks**—How accuracy is rigidly held by use of Erickson Speed Chucks is explained in Catalog "J". Also tool and work-holding problems are solved by case examples. (Page 126)
A-10-292	Ex-Cell-O Corp.	**Boring Machines**—Bulletin 31631 lists many advantages of Ex-Cell-O One-Way Precision Boring Machine, which bores, counterbores and grooves automatically. (Inside Back Cover)
A-10-29	Gisholt Machine Co.	**Lathes**—Bulletin shows No. 12 Hydraulic Automatic Lathe doing 28 widely different jobs, illustrating its flexibility. (Page 29-32)
A-10-32	Gisholt Machine Co.	**Balancing**—"Static and Dynamic Balancing" textbook contains facts and information on balancing. (Page 29-32)
A-10-158	Handy & Harman	**Brazing Alloys**—Bulletin 20 gives full facts on fast, low-cost metal joining, assembling parts with Easy-Flo or Sil-Fos preplaced at the joints—using a fast heating method such as oxyacetylene torch, furnace, electrical induction, etc. (Page 158)
A-10-248-4	Heinrich Tools, Inc.	**Fixture Locks**—Free Heinrich Tool Catalog tells how to increase production, cut tool costs with the use of "Grip-Master Screwless Fixture Lock." (Page 248)

USE THIS HANDY FORM ➡

to obtain further information about advertisers, trade literature or tools of today appearing in this issue of THE TOOL ENGINEER. No postage needed.

1053 *THE TOOL ENGINEER, DETROIT 21, MICH.*

READER SERVICE CARD

Please send me further information as indicated below:

(Mark Key Number of trade literature, tools or advertisements)

ADVERTISERS	TRADE LITERATURE	TOOLS OF TODAY
A—	L—	T—
A—	L—	T—
A—	L—	T—
A—	L—	T—

NAME _____ POSITION _____

FIRM _____ BUSINESS _____

Please Check One ☐ Firm Address ☐ Home Address STREET _____

CITY _____ ZONE NO. _____ STATE _____

THE TOOL ENGINEER'S *Service Bureau*

TRADE LITERATURE CURRENTLY OFFERED BY THE TOOL ENGINEER ADVERTISERS

LITERATURE NUMBER	COMPANY	DESCRIPTION
A-10-211	Illinois Tool Works	**Cutting Tools**—Every tool is illustrated and presented with complete dimensional and purchasing data in Illinite Catalog 101, covering end mills, milling cutters, saws, hobs, keyslot cutters, shaper cutters and end mills. (Page 211)
A-10-241	Kearney & Trecker Corp.	**Machine Tools**—Booklet entitled "Doorway to a Proven Method for Solving Big and Small Metalworking Problems" illustrates typical special machines and tooling already built. (Page 241)
A-10-129	Keller Tool Co.	**Drilling**—Free 24-page booklet, "The Hole Story of the Keller Air-feedrill" gives facts in brief about air-operated, hydraulically-controlled automatic drills. (Page 129)
A-10-16	Lapointe Machine Tool Co.	**Broaching**—Bulletin SRHE-5 explains the new horizontal Electro-Mechanical Drive. Greater flexibility and versatility available through dual speed and dual cycle features. (Page 16)
A-10-143	Lehmann Boring Tool Co.	**Boring Tools**—Catalog BT12 tells how to solve boring problems and cut machining time to a minimum. (Page 143)
A-10-197	Modern Industrial Engineering Co.	**Deburring and Chamfering**—Bulletin 103-60 describes the new BME-14 Universal Burr-Master that solves gear and spline deburring and chamfering problems. Burrs and chamfers the complete tooth form on both sides and root. (Page 196-197)
A-10-191	National Broach and Machine Co.	**Gear Shaving Machine**—Bulletin S53-7 gives details on two new Model GCU improvements—automatic differential up-feed and conventional crowning. (Page 191)
A-10-249	Pittsburgh Tool Steel Wire Co.	**Drill Rods**—Catalog No. 6 gives a compact treatise on all grades of drill rod rounds and shapes, precision ground flats and squares and other prefinished steels, tables, illustrations, heat-treating and other valuable information to users of fine steels. (Page 249)
A-10-28	Rivett Lathe & Grinder, Inc.	**Hydraulic Cylinders**—Catalog Section No. 106 illustrates and describes every type and size of the Rivett Hydraulic Cylinders. These units have deeper ring design, permitting cylinder to be rotated to convenient pipe connection. (Page 28)
A-10-108	Sorensen Center-Mikes, Inc.	**Micrometers**—Bulletin 652 gives complete information on center distance inspection gage. Direct reading to 0.0005 inch between hole centers in 30 seconds without hole dimensions. (Page 108)
A-10-120-1	Standard Parts Co.	**Jig and Fixture Parts**—66-page catalog with 150 drawings titled "Standard Jig and Fixture Components" shows components available for tooling. Engineering features described. (Page 120)
A-10-182	Sutton Tool Co.	**Collet Chucks**—Fully described in new catalog are the construction, specifications, and many standard and special applications of spindle-nose collet chucks available in a range of sizes. (Page 182)
A-10-176	The Van Keuren Co.	**Optical Flats**—Close checking of flat surfaces described with details of VK optical flats. Available in sizes from ½ inch to 10-inch diameter in 0.000001, 0.000002, 0.000004-inch accuracies. (Page 176)
A-10-205	Waldes Kohinoor, Inc.	**Grooving Tools**—12-page catalog gives full information on mechanical details, cutting sizes and extra features of Truarc Internal Grooving Tool. (Page 205)
A-10-186-1	The Walton Co.	**Metalworking Tools**—Catalog No. 86 offers information on Walton specialized tools for tap, pipe and stud extraction, and tool holding. (Page 186)

BUSINESS REPLY CARD
No postage stamp necessary if mailed in the United States

FIRST CLASS
PERMIT NO. 10782
(Sec. 34.9, P.L. & R.)
DETROIT, MICH.

THE TOOL ENGINEER
ASTE Building
10700 Puritan Ave.
Detroit 21, Mich.
ATT: READER SERVICE DEPT.

USE THIS HANDY FORM

to obtain further information about advertisers, trade literature or tools of today appearing in this issue of THE TOOL ENGINEER. No postage needed.

Resistance Welding Control

Since the heat control and

Countersink Gage

The "Trulok" rapid countersink gage is now available to companies requiring direct, exact measurements of countersink holes. This gage gives direct readings with large-size 0.005-inch divisions on a scale and can easily be read to .001 inch. Trulok requires no special skills; operation involves a single push of the gage head into the countersink. Once the measurement has been made and the direct reading reflected on the scale, the indicator remains set at a scale reading. It is easily operated with one hand, and a short pull on the upper knob releases the locking device of the gage and readies it for the next measurement.

Made of heat-treated tool steel with a satin-chrome finish, the Trulok gage is said to be trouble-free.

Gages for immediate delivery are available for direct measurement of 82, 90, 100, and 110-degree countersinks. Several different diameter ranges are offered for each angle.



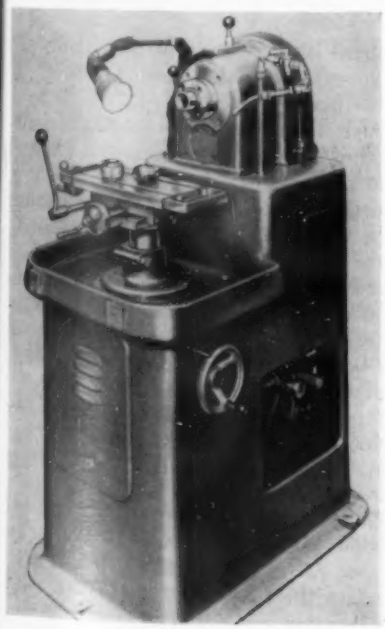
These gages are complete with a small calibration block for occasional checking, and a contour gage for monitoring the countersunk holes.

T-10-1071

Tool and Attachments for Metalworking

An unusual concept in metalworking machines has been set forth by Newage International, Inc., 235 E. 42nd St., New York 17, in its Rindis machine recently placed on the market. It performs more than 50 different operations with a reported speed, accuracy and economy.

The basic unit of the Rindis is universal in that it produces all the movements and the full range of speeds expected from any type of machine tool. A whole range of accessories are supplied in the form of complete units, any of which may be fitted to the basic unit to make the entire setup a single purpose machine tool. This feature makes the unit suitable particularly for experimental and research laboratories, mobile workshops etc., where work often calls for individual pieces, protoypes, samples, few of a kind or small batches of a part, and the wide range of work possible on the machine permits the designer to follow his part through to completion.

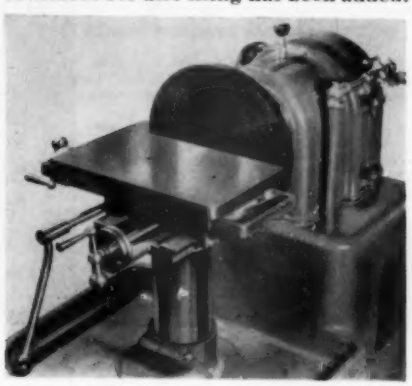


In the basic unit, the drive from the motor gives a range of 24 spindle speeds from 65 to 2,800 rpm making available almost any required speed.

Two locating pads are machined at the front of the head for the accurate location of various attachments. The rise and fall compound table is provided with micrometer dials and a rack and pinion. According to the maker, accessories are easily attached in matter of minutes, and quickly operable.

T-10-1072

Basic Rindis machine appears at the left, while in the photo below, as attachment for disc filing has been added.





L & I's broader range of high quality STANDARD reamers has met with overwhelming acceptance. Ask your distributor for latest information on L & I's quality plus . . .

L&I

The Reamer Specialists

LAVALLEE & IDE, INC.
CHICOPEE, MASS.
INDICATE A-10-107

Resistance Welding Control

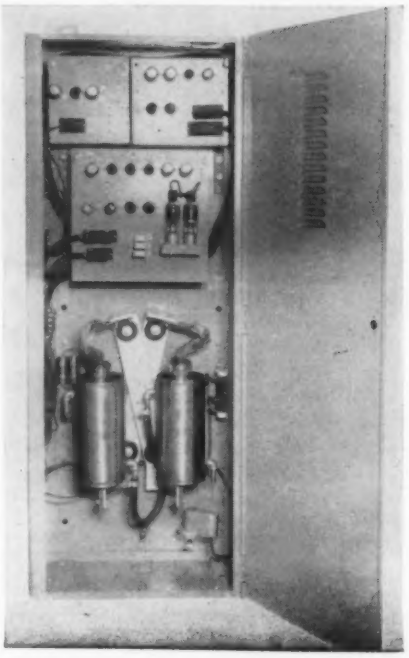
A synchronous-precision control for fast high-quality resistance welding of hard-to-weld metals has been announced by the General Electric Co's Industry Control Dept.

Designed for accurate regulation of the value of the current and length of time it flows, the control is particularly practical where short durations of weld current are necessary for high-speed applications.

It is adaptable for bench, spot, seam or combination welders, and can be used on motor-, fluid-, or air-operated welding machines.

Basic components of the new synchronous-precision control are an ignitron contactor which acts as a switch to turn weld current on and off; a weld timer and phase-shift heat control; and a sequence timer, if required, which controls steps in the welding cycle, such as—"squeeze," "hold," and "off."

The initiating circuit of the control can be either high or low voltage with one side of the circuit grounded for greater safety to the operator. A self compensating type of a-c circuit eliminates the need for voltage regulating tubes, and because of the circuit design, G-E engineers said, the new panel is more stable on voltage variation and regulation, thereby giving increased reliability of operation.



Since the heat control and weld-timer panel is the same for all of the various types of synchronous-precision control, the equipment may be changed at any time from one type of welding control to another by adding appropriate plug-in assemblies.

Additional details as well as diagrams and drawings explaining the control are available from the company's bulletin GEA-5945. T-10-1081

Leveling Screw

The precision made Opto leveling screw is designed to precisely align fixture bases, collimator mounts and telescope mounts to the desired position and permanently lock them in position. Particularly, the item avoids the situation which results in the necessity of aligning an instrument several times to secure an exact position due to the alignment being thrown off as the adjusting screws are tightened. Due to the design of the Opto leveling screw



there is no twisting or distortion whatsoever when the piece is locked in position.

Heretofore the most successful method of alignment has been with a system of push-pull screws requiring a lengthy period of time to achieve alignment due to the distortions set up in adjusting the various screws. With the Opto leveling screw the instrument is smoothly brought into adjustment by turning the lower knurled screw and then positively locked into alignment by means of the upper knurled screw. For more information, write Opto Engineering Co., 3406 W. Washington Blvd., Los Angeles 18. T-10-1082

USE READER SERVICE CARD ON PAGE 105 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION



FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-108

Sine Angle Plate

Any angle from 0 to 90 degrees can be set or measured quickly and accurately by use of the Bemisine angle plate, manufactured by Mutual Machine Co., 3 Loring St., Hudson, Mass. All that is required with this device is a two-inch micrometer. The plate is set faster than the conventional sine bar or bevel protractor as no time is required for mathematical calculations or the setting of gage blocks.



The tool is composed of a drilled and tapped plate of oil-hardened tool steel mounted pivotally in a right-angle cast steel base. A measuring pin is located in the pivoting assembly and a measuring block is fixed in the base. Measurement by micrometer over the pin and the block provide sine readings in true relationship to the angular position of the plate. (Gage blocks may be used between the pin and the block.) Angles to one minute accuracy are guaranteed by the manufacturer.

For setting an angle, the plate is initially set in position and held by means of a sensitive knurled knob. When the proper micrometer measurement has been verified, the plate is locked with a standard Allen wrench.

The Bemisine is used to hold work for drilling, jib boring, light milling and grinding operations as well as an inspection tool. **T-10-1091**

Preheat Calculator

Welding preheat and interpass temperature calculator has been reissued in accordance with latest welding practices and is placed on the market by The Lincoln Electric Co., Cleveland 17. This calculator uses slide rule principles to permit quick and accurate calculation of the preheat and interpass temperature required when the hardening or cracking tendency of metal being welded can be minimized by preheating.

Experience indicates that in some cases best quality welds in high carbon and some alloy steels are obtained by using preheat. The amount of preheat will vary depending on the chemical analysis of the metal and the thickness. When the analysis and thickness are known, the calculator, working from this information, gives the amount of preheat required for a satisfactory welding procedure. Thus, it serves as a guide to correct procedure which is based on factual information. The percentage present of elements such as carbon, manganese, silicon, phosphorus chromium, nickel, molybdenum, vanadium and copper is worked into the calculation along with metal thickness ranging from ½ to 10 inches.

As the number or percentage of elements in steel increases and the thickness of plates to be welded increases, preheating may become desirable for high quality welds. Therefore, the calculator is designed to indicate the few cases where it is necessary. **T-10-1092**

USE READER SERVICE CARD ON PAGE 105 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION



KNIGHT'S
Power Feed
ROTARY TABLES

- **Completely Self-Contained Motor Driven Units**
- **No Set-Up Time — No Special Equipment**
- **Just Plug Into Nearest Electric Outlet**

Especially designed for fast, precision Cycle Milling and Indexing—Continuous Face Milling—Cam Milling—Other special purpose jobs that require an Automatic Revolving Fixture. An exceptional time and labor saver!

20" MODEL: 18 quick-feed changes, 1½" to 52", or 3" to 108"

42" MODEL: Infinite variable feed. Table can be increased to 72" with subplates.

KNIGHT — VERSATILE · ACCURATE · RIGID — MILLERS

Mail Coupon For Brochure

ATTACH TO COMPANY LETTERHEAD

W. B. KNIGHT MACHINERY CO.
3930 W. Pine Blvd., St. Louis 8, Mo.

Send information on Power-Feed Rotary Tables

NAME.....

TITLE.....

☐ Also send details on Knight Milling Machines

W. B. KNIGHT MACHINERY CO.
3930 WEST PINE BLVD., ST. LOUIS 8, MO.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-109

Surface Grinders

Completely automatic high production Rotamatic surface grinders, hydraulically and electrically controlled for a complete grinding cycle with automatic stop, have been added to the line of Standard Electric Tool Co., 2499 River Rd., Cincinnati 4. Switch panel of the unit includes the start button, with separate optional control of grinder spindle, work spindle, coolant pump and optional energizing or magnetic chuck for wheel dressing.

The standard 7½ or 10-hp of the unit's precision motorized grinding spindle has heavy end thrust construction. The unit is arranged for type 2 (cylinder type) steel back grinding wheel, or segmental wheel chuck. It has a structural plate steel grinding wheel guard; graduated hand wheel for independent vertical adjustment; grinder head actuated on hydraulic lift-type column with neoprene bellows protection; and adjustable stop for depth of grinding cut.

The precision chuck spindle has built-in Rotary magnetic chuck and rectifier inside the base.



Equipment includes motor drive to work spindle, motorized hydraulic pump, motor-driven coolant pump with hydraulically controlled coolant nozzle. Large area base opening is protected with removable louvered cover.

T-10-1101

CLEVELAND Electronic Production Gages Fill *Lamb Electric's* Need for Quick Setup, Precision, Efficiency

LAMB ELECTRIC COMPANY makes standard and special motors in lots of 50 to many thousands. All armature shafts are checked at two or more points for diameter and out-of-round, to tolerances of .0002" to .0005".

Small-lot production requires frequent changes in setup of gaging equipment. High production of standard items calls for rapid inspection; and close tolerances require gaging equipment that is sensitive and dependable. To meet these requirements, Lamb Electric uses Cleveland electronic production gages, as shown—(1) for checking single OD's at the grinding machines, and (2) for checking diameters two at a time in 100% final inspection.

The gage heads are on fixtures built by Lamb Electric. The operator rotates the shaft on an anvil beneath the gage head, and observes the deviations in size shown on a meter. On dual units, two gage heads and meters are used—one for each diameter.

This equipment gives these specific advantages:

Quick Changeover. Ralph Nash, Chief Inspector at Lamb Electric, says "We can set up our Cleveland gaging equipment in a couple of minutes."

High Sensitivity. Amplifiers that read .0005" or .000050" per scale division (selected at will) give this user the desired range and sensitivity. Other standard amplifiers read .0001"/.000010" per division.



Checking armature shaft at the grinding machine for OD and out-of-round, using Cleveland electronic production gage.

Dependability. The frictionless gage head movement, drift-free amplifier and high-speed meter assure consistent repeat readings. • Lamb Electric have used Cleveland gaging equipment continuously for five years, and Mr. Nash reports "Maintenance is no problem."

Cleveland electronic gaging equipment may be what YOU need for faster, more accurate gaging—or for licking some special measurement problem. Illustrated bulletins will tell you. Write!



One of five final-inspection setups for checking OD and roundness of armature shafts at two points simultaneously.

Designed, developed and manufactured by

CLEVELAND INSTRUMENT CO.

Formerly Graham-Mintel Instrument Co.

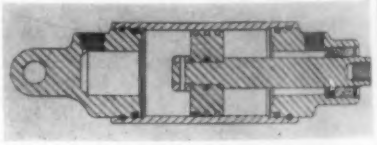
741 CARNEGIE AVE. CLEVELAND 15, OHIO

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-110

Key-Type Hydraulic Cylinders

Carter Controls, Inc., 2910 Bernice Rd., Lansing, Ill., announces the development and production of an improved key-type hydraulic cylinder. A number of features make it desirable from an application and service standpoint.

The meehanite rod bearing is long, providing a full one to one surface for extra wear. Chevron type packing is



replaced easily and the whole bearing insert is held by merely inserting a locking snap ring at the rod end.

Cast steel mounts are standard equipment and are an integral unit combined with the head and rod caps of the cylinder. These head and mount combinations are easily disassembled by removing the internal locking key ring which unites the head and cylinder wall. No bolts are used in this construction, eliminating the possibility of loosening.

This design permits the cylinders to be the smallest in diameter and length at no sacrifice in strength, and allows a safety factor of 6 to 1 in all bore sizes.

T-10-1102

Di-Profiler for Carbides

Tungsten Carbide dies can be repaired, altered and even produced, from blanks of presintered carbide according to Nord International Corp., P.O. Box 44-N, 133 Denville, N. J., who have produced the Nord Di-Profiler for such purposes.

In making the triangular shaped drawing die pictured with this tool, work stages were as follows: Made hole in the presintered carbide die blank by means of a rotary diamond grinding tool and with aid of diamond files it was given triangular shape; did final sintering; achieved near-size with diamond files; cast iron lapped with diamond compound (coarse); cast iron lapped with diamond compound (medium);



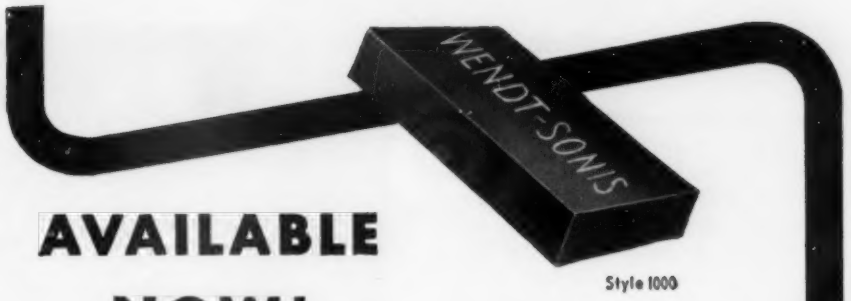
cast iron lapped with diamond compound (fine); fibre lapped with diamond compound (extra fine).

A prime feature of the tool is its actual lack of vibration during operation, even when used at long stroke which may be adjusted from 0 to 0.250 inch. Reason for this accuracy is the full ball-bearing construction and the eccentric balancing construction of high precision. "Fifty times faster than by hand" is said to be a fair estimate of its speed. Action is reciprocating and oscillating at will, to the amount desired and when used with the spindle attachment, finely controlled rotary action is also obtained.

For repairing or working carbide dies, a wide variety of diamond files is available at Nord in standard and special shapes, in addition to a complete line of burs in round, inverted cone, straight (crosscut), taper (crosscut), and other standard or special styles. Special holding fixtures for holding stones in a wide range of abrasive qualities for other work also are available, in addition to the stones themselves which are carried in stock.

Literature is available from the company on both the Nord Di-Profiler and burs for use in it. **T-10-1111**

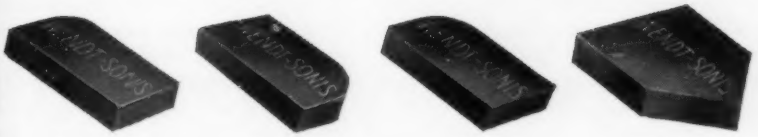
USE READER SERVICE CARD ON PAGE 105 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION



Style 1000

AVAILABLE NOW!

The new line of WENDT-SONIS *Carbide* BLANKS


Style 2000 Style 3000 Style 4000 Style 5000


Reamer Blanks Solid Round Solid Triangular Center Tips



NEW! Write for the new "Tooling Tips" folder, Form 553, that contains complete details and prices for the new carbide blanks. Send a postcard to Dept. S.

Your local distributor now has a complete line of new Wendt-Sonis carbide blanks and inserts, in addition to his line of W-S carbide cutting tools.

Blanks are available in a wide range of styles including reamer blanks, solid rounds, and center tips. Inserts are made in triangular, square, round and diamond shapes. Both blanks and inserts are made in a variety of grades and sizes.

Wendt-Sonis carbide blanks and inserts are made to the same exacting standards as other Wendt-Sonis tools. Hundreds of production runs have proved that Wendt-Sonis blanks and inserts increase production and lower tool costs.

WENDT SONIS

HANNIBAL, MISSOURI

576 N. Prairie Ave.
Hawthorne, California

549 W. Randolph
Chicago, Illinois

A COMPLETE LINE OF CARBIDE CUTTING TOOLS AND BLANKS

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-111

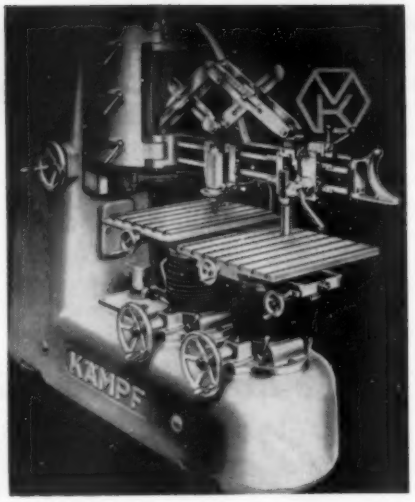
Duplicating Milling Machine

A mold-copying milling machine, type FK/2a, introduced by Michael Mampf K. G., Frankfurt Am Main, reproduces complicated parts from different kinds of materials with precision and is said to offer several advantages.

The unit works from a scale template or pattern, reproducing the part to be milled on an enlarged scale. A vertically moveable precision pantograph, which is mounted on a rigid and horizontally oscillating arm, permits desired reduction for any given case.

Mounting on the solid arm eliminates to a high degree, vibration of the milling spindle, which provides more efficient stock removal capacity as well as a better surface finish and a higher dimension accuracy.

Accurately adjusted cross-slides glide on the prism of this horizontal arm and carry the holders of the milling spindle and the guide finger. As a result, excellent tridimensional milling copying is possible. Further, construction of the pantograph in conjunction with the horizontal arm, makes certain the high quality of vertical milling as part of



tridimensional milling. The pantograph *is* adjustable within limits of reduction in size of from 1.5 to 4 times, *is* possible through adjustment. (The form bench is adjustable in three dimensions.)

A special reduction gear regulates speed of the milling spindle within limits of from 270 to 6400 rpm to adjust operation in accordance with requirements of different materials. Because of direct manual operation of FK/2a continuous tracing of the forms is possible, and at the same time permits the operator to make sensitive adaptations to the tool and material. Thus he can reproduce duplicates that require little if any finishing. For this same reason of manual operation, relatively thin milling cutters and dulicating pins can be used since manual operation makes it possible to avoid defects resulting from the elasticity of weaker tools. Tracer controlled devices move intermittently, operation depending on the nature of the control and its connecting and transposing elements. Easy manipulation of the RK/2a allows continuous speed and is not affected by weight of the work.

A special nitrided steel has been used for all gliding parts of the machine to give them the advantage of durability as well as high accuracy and smoothness of operation. **T-10-1121**

Automatic Parts Washer

Quick, automatic cleaning of small parts, complete assemblies and tools is made possible by an air-powered washer now being produced by Kelite Products, Inc., 1250 North Main St., Los Angeles 12.

Cleaning is achieved by the action of an oscillating turntable which is submerged in a cleaning solution. Parts to be cleaned are placed in a specially designed perforated basket which rides on the turntable, while complete assemblies, such as typewriters, are placed directly on the turntable.

Speed of the Kelite Automatic Parts



Washer may be varied from 0 to 240 oscillations per minute by dialing the desired speed on the ¼-hp air motor. The motor is operated by commonly available air pressures of from 30 to 120 psi.

An integral part of the machine is the solution-saving drain tray, which catches the solution drained from cleaned parts and returns it to the tank.

Bulletin 129 illustrates and describes the machine in detail. **T-10-1122**

Automatic—Single Line Feeding
—of Small Parts
with
SYNTRON
PARTS
FEEDERS





Syntron Parts Feeders greatly increase capacities and speeds for production handling of small parts. They provide fully automatic, oriented, single line feeding to grinding, packaging, inspecting, and many other automatic machines and processes. Electromagnetic operation—finger-tip controlled feeding of parts of most shapes, sizes, and materials.

Write for complete catalogue information—Free.

SYNTRON COMPANY

340 Lexington Ave. **Homer City, Pa.**

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-112

Carbide Grinding Wheel

An unusual type of grinding wheel, identified by the symbol MM, for the grinding of all types of cemented carbide tools, has been announced by Macklin Co., Jackson, Mich., following several months of research and development. The company offers results of field tests to show that grinding time can be reduced as much as fifty percent and wheel life increased as much as three hundred percent with this product. In the grinding of inserted carbide single point tools, the Macklin MM wheel grinds the shank steel equally as well as the carbide itself. One outstanding fact is that metallurgical injury to the carbide is eliminated.

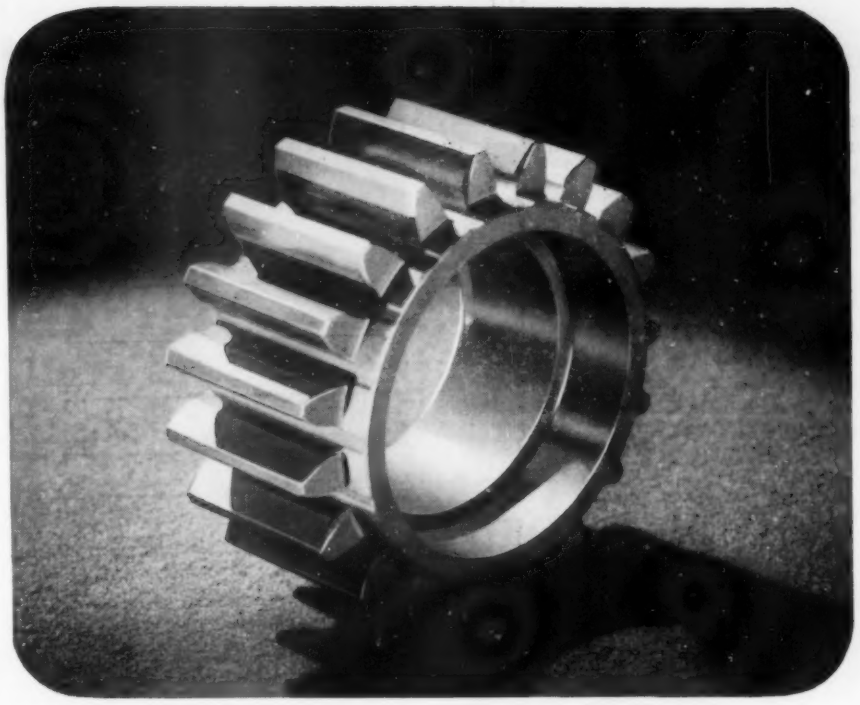


Through scientific application of recognized requirements in the cemented carbide field, this wheel has been constructed to achieve faster cutting, better finishes and longer life than previously was obtainable from wheels of conventional construction. A fine, loose abrasive is embedded, in pellet form, throughout the wheel. As the tool is applied to the wheel, a flow of loose abrasive is constantly between the metal and the wheel. This permits the main body of the wheel to be somewhat harder than is normally used for the grinding of carbides. The fine grain, in the pellet, accounts for the better finish obtainable, and the harder grade resists excessive grooving of the wheel, resulting in less dressing to maintain the proper grinding surface. In addition, the use of the Macklin MM wheel practically eliminates this dusty condition which usually accompanies dry grinding of carbide tools with a conventional wheel, and which is irritating to the operator.

The wheels are available at the present time in the standard steel back and cylinder sizes in a variety of gradings to meet specific requirements.

T-10-1131

USE READER SERVICE CARD ON PAGE 105 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION



IN ONLY 3½ DAYS

"PUTTIN'-ON-TOOL"

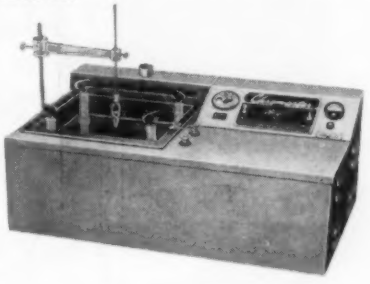
saves leading press manufacturer $2100 on spur gears

The bore diameter of flame-hardened precision gears like the one above used to be a costly problem for R. Hoe & Co., Inc., one of the leading manufacturers of large newspaper presses.

Constant orders for this particular gear, each specifying the bore diameter to extremely close tolerances, had to be met. Since manufacturing costs exceed $26.00 per gear, neither making up specials—nor annealing, reboring, and rehardening—was an economical solution. What HOE needed was a "puttin'-on-tool."

That's exactly what they have in their new Chromaster Industrial Chrome Plating Unit, which they use to adjust the bore diameter of stock gears to specification. Recently in a 3½ day period they were able to plate 81 of these gears with chrome deposits ranging from .0002" to .005" at a saving of $2100.

Chromaster can save you money, too. Write us.



CHROMASTER SALVAGES undersized parts, worn tools and gages right in your own shop. It's so simple to operate that no previous plating experience is needed. The chemically stable plating solution is deposited at a rate of .002" per hour for a cost of 7 mils per sq. in. One of six models will meet the requirements of every shop.

Chromaster

Industrial Chrome Plating Units
20, 50, 250, 500 and 1000 amp. units

Ward Leonard Electric Co.
Industrial Chrome Division
15 South Street,
Mount Vernon, N. Y.

Please send me information on industrial chrome plating with CHROMASTER.

COMPANY.....

NAME..... TITLE.....

ADDRESS.....

CITY..... ZONE..... STATE.....

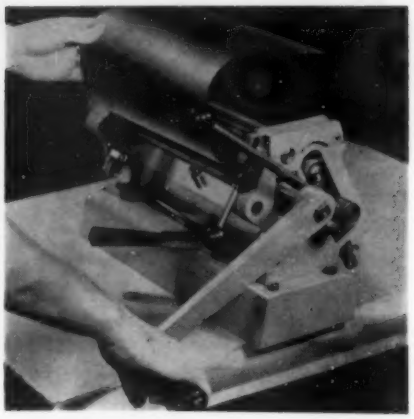
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-113

Hand-operated Roller

Addition of six new models of a hand-operated roller, said to increase the material capacity and forming width over previous models, has been announced by O'Neil-Irwin Mfg. Co., 625 Eighth Ave., Lake City, Minn.

Designated Di-Acro Rollers, these models have a material capacity ranging from 16 to 24 gage sheet steel, forming width range of 12 to 42 inches, and radius capacity from two inches to infinity.

A cam-idler feature incorporated into the design of the roller makes it possible to form circles of any diameter in two passes through the rolls—something that usually takes several operations in an ordinary slip roll.



Circles of the same diameter as the forming rolls or slightly larger can be formed in one pass through the roller by making a slight adjustment.

Bends can also be located in any position along a sheet of material being formed in the roller because the material can be fed through the rolls without bending until the cam lever is engaged. As a result, rectangles and a variety of other shapes—with straight sections on both sides of the bend—can be produced.

Round, flat and square stock as well as many other ductile materials can be formed with this precision machine. Special rolls for special bending jobs can be supplied.

Sample material with specifications may be submitted for test forming or sample duplication. **T-10-1141**



NATIONAL METAL EXPOSITION
Oct. 19th . 23rd
Cleveland, Ohio
Booth No. 2334

The P. D. Q. (Portage Double Quick) tool holder and adapter line opens a new era in quick change tools. These Portage tools not only mean new speeds in production and set-up time, but increased accuracy as well.

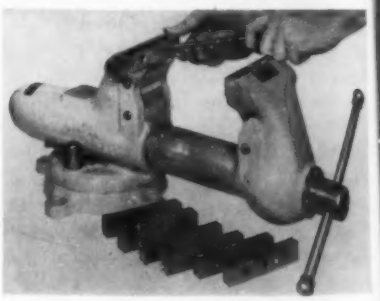
Send for the New P. D. Q. Catalog

PDQ **PORTAGE Double-Quick TOOL CO.**
1054 Sweitzer Avenue • Akron 11, Ohio

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-114

Replaceable Vise Jaws

A complete variety of replaceable vise jaws, available on all Wilton vises, has been announced by Wilton Tool Mfg. Co., 925 Wrightwood Ave., Chicago 14, Ill. Hardened speed-treat steel jaws with diamond serrations provided as standard on all the company's machinists', and jewelers' vises and combination bench and pipe vises, may be replaced with smooth jaws of hard or soft steel. Smooth jaws of brass or copper, which are nonmagnetic and nonsparking, are also available, as are plastic fiber jaws designed for delicate work surfaces.



The jaws are easily removable and interchangeable. Since most vise jaws wear first on the top surface, these have been designed so as to be reversible, virtually doubling life of the jaws.

A 28-page catalog illustrating Wilton vises and other industrial clamping tools is available from the company. **T-10-1142**

USE READER SERVICE CARD ON PAGE 105 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

New • Fast • Proven

Diamond Wheels

An electroplated nickel bond diamond wheel line is announced by the Ohio Metal Working Products Co. Developed by Paul L. Herz of the Belgian Tool Co., the new bonding process deposits electrolytically a dense nickel bond around each diamond particle. This means, according to the manufacturer, that the diamonds are held more firmly than possible with conventional materials so that the diamonds do not break out or impact.

The nonporous nickel bonding material, due to its greater density, prevents the wheels from loading. In numerous instances, the new nickel-bonded wheels have been used up without requiring any dressing.

The electrolytic nickel bonding process require the use of only one layer of diamonds which are applied to each



wheel in the greatest concentration for the nickel to hold. Hence, the nickel bonded steel wheel is less susceptible to damage by gouging and careless handling than the thicker, softer sintered bond wheels.

Costs of grinding are reduced by the nickel bond wheel, according to the manufacturer. Due to the fact that fewer dressings are required, the diamonds are used up, instead of being dressed out of the wheel. Rapid cutting action gives a low hourly grinding cost, while the longer wheel life and faster action combine to reduce the per tip costs to approximately one-half the generally accepted national average.

Wheels will be available in a complete range of sizes. Further information may be obtained by writing to Ohio Metal Working Products Co., 1836 Euclid Ave., Cleveland 15. **T-10-1151**

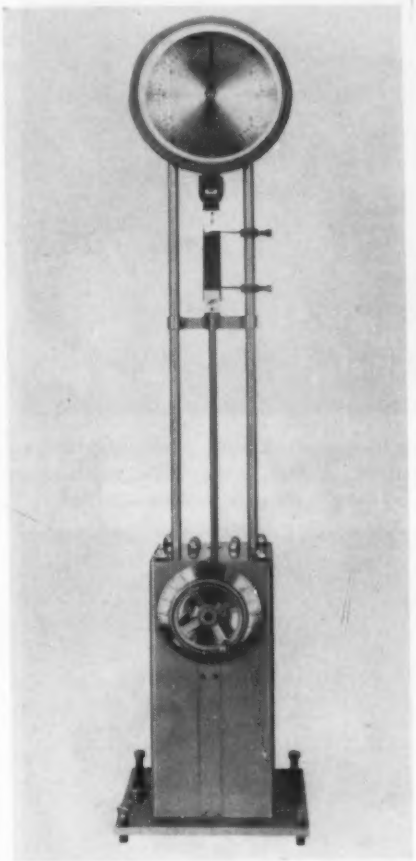
Hand Truck

Magnesium Co. of America, East Chicago 19, Ind., announces a magnesium hand truck. The Magcoa hand truck weighs 18 pounds, but its rugged capacity tops 500 pounds. It weighs one-fourth to one-third that of hand trucks made of other materials with comparable capacities. Its all-bolted construction enables easy replacement of parts. **T-10-1152**

Tensile Tester

A recently developed small capacity tensile tester, manufactured by John Chatillon & Sons, measures the tensile properties of fibre, cloth, cord, rubber, and many other similar materials.

Operation is by means of a handwheel which is graduated to read extension in increments of 0.001 inch. This handwheel drives a single thread worm gear which automatically holds the tension at any given point. Tension load



is read by a single pointer which will remain at the point of maximum load until it is manually reset to zero.

Standard capacities are available from 1 to 100 lb with either pound or metric graduations.

The tester is approximately three feet high and is normally supplied with quick action clamps capable of holding specimens up to 1 inch wide by $\frac{1}{8}$ inch thick at a maximum extension distance of 15 inches. An additional feature is the easily adjusted tolerance pointers which are held to the dial arm by permanent magnets. **T-10-1153**

USE READER SERVICE CARD ON PAGE 105 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION



Solve

straight-line motion problems



with O-M CYLINDERS (air • hydraulic)

elevating • lowering • pushing • pulling • tilting • clamping • opening • closing • knock-out operations

From a smooth, delicate push on a testing machine to a rugged thrust on a press application, O-M Cylinders handle all straight-line motion problems with ease and precision. *Special interlocking mechanism* eliminates needless tie rods, end caps . . . saves 1/3 INSTALLATION SPACE. Also assures better alignment, gives O-M the lowest coefficient of friction of *any* cylinder . . . smoother performance at low or high pressure regardless of length of stroke. End plugs tapped for universal mounting. Any one or combination of mounting brackets may be used to install . . . *without disassembling or changing cylinder.* Easily removed, inspected, repaired.

Available in a full range of sizes (1½" to 8" bores) with standard, 2 to 1 or oversize rods. All machined steel with bearing bronze, no castings. Completely interchangeable parts.



14-day delivery on most sizes

Send today for FREE catalog and complete set of ½ and ¼-scale templates showing all cylinders and mounting brackets.

MAIL COUPON NOW!

ORTMAN MILLER MACHINE CO.

1216 150th Street • Hammond, Indiana

☐ Please send latest O-M catalog.

☐ Please send complete set of templates.

Name .....

Company .....

Address .....

City ..... Zone ... State ....

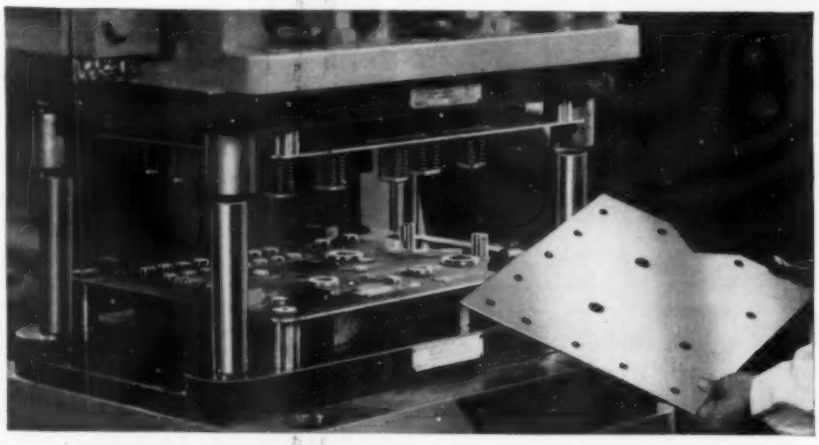
INDICATE A-10-115-1

New • Fast • Proven

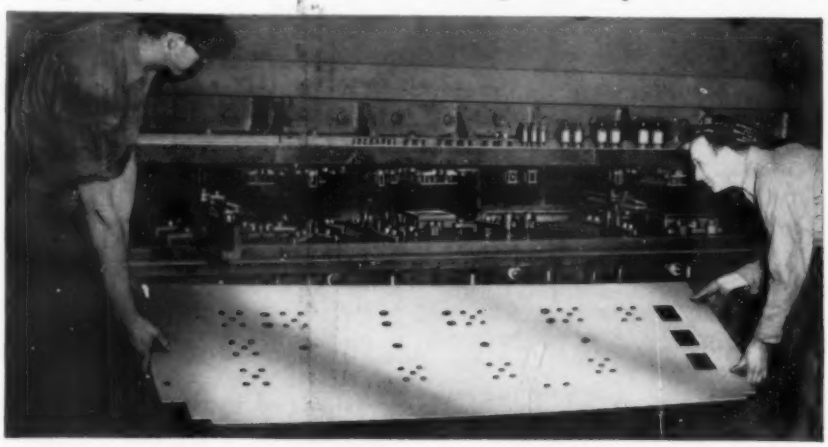
LOW COST methods for PERFORATING and NOTCHING SHEET METALS

REDUCE DIE COSTS

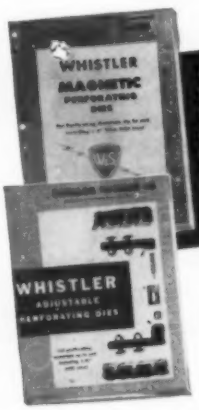
All units and parts are interchangeable and used repeatedly in different arrangements. **INCREASE PRESS PRODUCTION**—*Down time is minutes as compared to hours for change-over.* For precision work in all types and sizes of presses. **START PRODUCTION AT ONCE.** Pierce materials up to ¼" thick mild steel. Standard sizes and shapes available up to 3 inches. Special sizes to order.



Whistler *MAGNETIC* Dies at work in large inclinable press. Magnetized retainers hold the units. No bolting required. A fast, economical method in making up a punch and die set for short or long runs. All parts re-usable.



Whistler *ADJUSTABLE* Dies on perforating and notching job, using Tee slotted die set. With Whistler Adjustable Punch and Die units production starts within hours instead of weeks. Last minute job changes made quickly.



● Here are the complete details with prices and application illustrations. Send for these catalogs. No obligation.

NAME

FIRM

ADDRESS

CITY ZONE STATE

S. B. WHISTLER & SONS, Inc.

Adjustable, Magnetic, Custom and Cam Dies for all Industry

744 Military Road, Buffalo 23, N. Y.

VISIT US AT BOOTH 2024 — NATIONAL METAL SHOW — OCT. 19-23

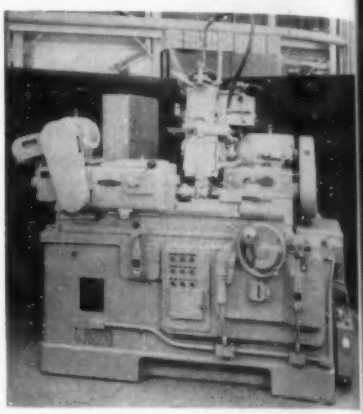
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-116

Piston Grinding Machine

Norton Co., Worcester, Mass., has introduced a "packaged unit" for piston grinding—a 6 x 8-inch semiautomatic piston grinding machine.

Because of its fast, accurate action this machine provides a particularly economical means of grinding elliptical automotive and aircraft type pistons to fine limits of size and finish. It can be specially arranged for grinding complex skirts where the degree of relief varies from the top to the bottom of the skirt.

The machine is a heavily built plunge grinder with a time-tested wheel spindle unit and a proved cam generating mechanism of extreme endurance. This



mechanism gives the special motion to the workpiece for grinding required skirt form.

The hydraulically actuated revolving feed screw wheel feed mechanism contributes considerably to the productivity of the machine because of its fast, precise action. This provides hydraulic features for rapidly traversing the wheel head, and mechanical micrometer screw feed during the grinding feed stage to assure accuracy in sizing.

Since running the machine requires little actual operating effort, the operator can devote the major portion of his attention to loading and unloading duties. Wheel truing is done automatically by a wheel-guard type truing device on touch of a push button. The automatic grinding cycle is started by movement of a single lever.

For speeding setup and operation, all controls for feeds and speeds are grouped at the operating position on front of the machine. For simplifying maintenance functions, all pumps, motors, relief valves, and flow control valves are mounted in accessible locations on the outside of the machine, and electrical controls are grouped compactly in an elevated enclosure.

T-10-1161

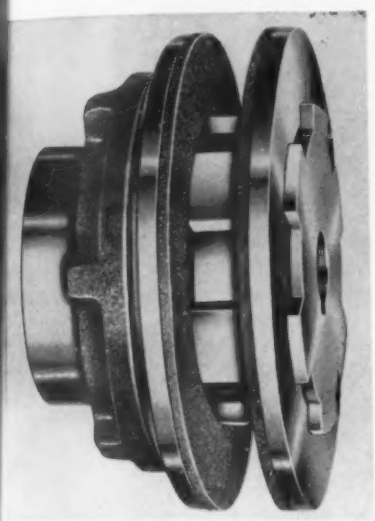
USE READER SERVICE CARD ON PAGE 105 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

VERSATILE

Adjustable Clutches

A line of adjustable torque-limiting clutches that provide overload protection for machine drives in a wide variety of equipment is announced by Morse Chain Co., 7601 Central Ave., Detroit 20. These compact slip-type friction clutches act as automatic shear pin mechanisms and avoid the time and labor required to insert new shear pins. Adapted to roller chain drives, the units are designed for use with standard Morse Type A plain plate roller chain sprockets. Other types of rotating members can be used with the clutches.

The clutches also are adopted as overload protection devices in the power drives of many types of industrial machinery where the torque capacity of the drive does not exceed 260 foot pounds.



The clutches consist of a steel body, two steel clutch plates, two friction disks, a Belleville clutch spring and a cast iron adjusting nut. The rotating member is held between the friction disks through spring pressure exerted on the clutch plates that slide on splines on the hub. The torque setting of the clutch is obtained by adjusting the spring tension with the threaded thumb nut.

Slip-type torque-limiting friction clutches provide several advantages: the overload setting can be readily determined without mutilating a component; the clutch is tamper-proof in that the maximum setting cannot be exceeded—as can be done by increasing shear pin diameters or varying shear pin material; they are lower in cost than standard roller chain shear pin sprockets; time losses encountered in repairing shear pin devices are completely eliminated; the cost of replacing shear pins is avoided.

Morse Torque-Limiting clutches are mounted on driveshafts with a standard keyway and setscrew arrangement. They are easily disassembled by removing the adjusting nut, which permits the spring, clutch plates, friction material and rotating member to be slid off over the hub.

In operation, the rotating member of the clutch breaks away from the disks at the overload torque setting. Then the rotating member remains stationary in relation to the clutch hub with the friction torque of the clutch remaining at from ⅛ to ½ the overload setting. Thus the clutch rotating member is rendered inoperative until the drive is shut off and the overload condition corrected. **T-10-1171**

Plastic Coating

Through a recently developed exclusive process, Pyramid Plastics, Inc., 554 W. Polk St., Chicago 7, Ill. announces that it can apply a plastic coating on such items as flexible steel tubing, metal and paper jacketed tubing and other hard-to-coat materials. The process is applied according to customer requirements with various types of thermoplastic materials.

The method produces a continuous coating that leaves a smooth outer covering which will not reduce the flexibility of the product itself or allow the coating to penetrate small openings in the item to be covered. **T-10-1172**

ARTER *Precision*

ROTARY SURFACE GRINDERS
for Jet and Piston Engine Airplane Parts

THE MODEL "A"

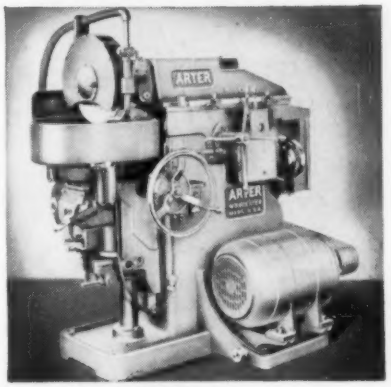
Model "A". Grinding is done on the periphery of the wheel, the work being held by a rotating magnetic chuck. Two sizes: 8" and 12" diameter.

THE MODEL "B"

Model "B". Four chuck capacities — 20", 24", 30" and 40". These machines are mainly hydraulically operated. Great vertical capacity. Work table can be tilted.

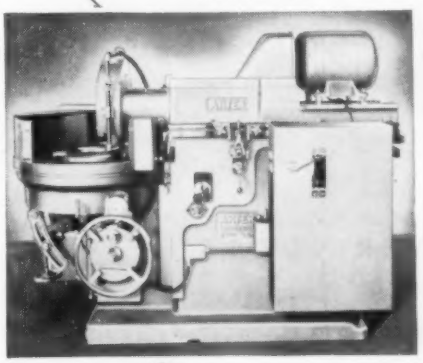
THE MODEL "D"

Model "D" — two chuck capacities — 12" and 16". A 7½ h. p. motor, precision balanced, mounted on the wheel slide delivers full power by multiple vee belts, to the wheel spindle.

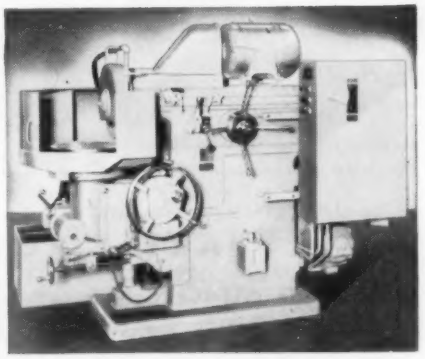


MODEL "A"

MODEL "B"



MODEL "D"



Write today for complete details and specifications

Arter GRINDING MACHINE CO.
WORCESTER 5, MASSACHUSETTS

Rotary Surface Grinders, Flat Circular Cutter Grinders, Internal Grinders, Cylindrical Grinders, Carbide Tool Grinders.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-117

VERSATILE PERFORMERS



Jarvis POWERFUL

FLEXIBLE SHAFT MACHINES

BENCH, FLOOR, OR OVERHEAD SUSPENDED MODELS



An industrial machine for industrial users

Here are truly versatile machines that will do your GRINDING, CUTTING, BUFFING, DISC and DRUM SANDING, WIRE BRUSHING, and ROTARY FILING operations — Faster and More Economically.

Let a Jarvis representative aid in analyzing your needs. This service is available without cost and assures you of getting the *right* machine in the *right* place at the *right* time.

Send for our complete catalog containing illustrations and specifications of various models.

JARVIS POWER TOOLS

TAPPING ATTACHMENTS • TAPS • FLEXIBLE SHAFTS AND MACHINES • ROTARY FILES • TUNGSTEN CARBIDE REAMERS • MILLS • DRILLS • BORING BITS

THE CHARLES L. JARVIS CO.
MIDDLETOWN IN CONNECTICUT

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-118

Fork Lift Truck

Development of a 1500-pound capacity fork lift truck designed to provide maximum maneuverability, ease of maintenance and operator convenience was announced recently by the Baker-Raulang Co.

Called the FL-15, the truck is capable of stacking 36-inch loads in a six-foot aisle.

Despite its short over-all length, the FL-15 has exceptional stability due to a low center of gravity.

Ease of maintenance, a major consideration in the truck's design, was accomplished by the location of all major maintenance elements in a cowl directly under the driver's seat. This cover



is bolted to the frame and can be removed in minutes for any necessary maintenance or repairs.

Visibility on the FL-15 is excellent. Elimination of the usual cowling in front of the operator gives him perfect all-round vision at floor level. And the offset position of the driver's seat provides him with an unobstructed view of both the load and any plant fixtures.

Special feature of the truck is Baker's patented trailing axle which allows it to "step over" uneven surfaces and floor obstructions and allows short, easy turns. Mounted in giant rubber blocks, the trailing axle cushions both truck and load from possible shocks.

Other important design features of the FL-15 include: bevel-and-spur gear reduction to provide constant, smooth tractive power and reduce maintenance costs.

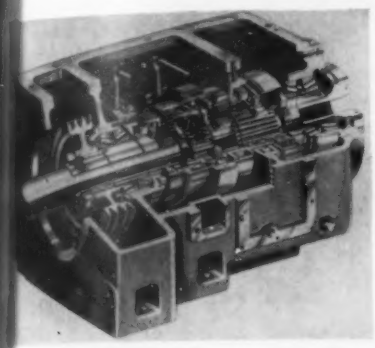
Specifications for the FL-15 are: The truck is 95 inches long, 30 inches wide and 83 inches high. It has a turning radius of 59 inches and a lift of 130 inches. T-10-1181

NEW BIG

Tool Block

Turret Lathe

An unusual concept in machine tool design is presented in the turret lathe that encorporates a hydraulically actuated drive which has been made by Morey Machinery Co., Inc., 410 Broome St., New York. As a consequence of the planetary gear, control of the headstock is simply a push button operation. On the unit, work can be done at whatever exact speed it requires. In the



high range, spindle speeds are said to be infinite at practically constant horsepower. In addition, the designers claim that gears can be shifted instantly, even from "high forward" directly into "reverse," since there are fewer moving parts involved than in conventional headstocks.

The cut-away view shown here reveals the center gears, planet pinion gears, internal gears, hydraulic cylinders, clutches and brakes. Precision roller bearings at the spindle front and rear permit the machining of heavy parts at high speeds with close tolerances. **T-10-1191**

Name Plate Retainer

Shakeproof, Division of Illinois Tool Works, 2501 No. Keeler Ave., Chicago 39, has designed a special retaining spring to hold a plastic name plate securely in place. Once in place, the fastener resists vibration loosening, providing a secure, positive lock.

The fastener is easily installed by pressing it into position between two plastic studs, using only the fingers. As the spring is pressed into position, the toothed end legs bend inward, affording easy passage. However, once the spring is in position the teeth on the legs bite into the plastic studs effecting a positive lock. Vibration or pressure against the name plate will only make the teeth bite deeper into the studs and lock tighter. **T-10-1192**

USE READER SERVICE CARD ON PAGE 105 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION



FINEST

- for SPEED
- for ACCURACY
- for VERSATILITY
- for ADAPTABILITY
- for MAINTENANCE



TORQOMATIC by Jarvis

AN INDUSTRIAL MACHINE FOR INDUSTRIAL USERS

Jarvis POWER TOOLS

TAPPING ATTACHMENTS • TAPS and DIES • ROTARY FILES FLEXIBLE SHAFTS and MACHINES • TUNGSTEN CARBIDE REAMERS and MILLS • DRILLS BORING BITS

Finest for SPEED: Taps more quality threads per hour, more holes than any other tapping attachment.
Finest for ACCURACY: Attaches firmly to drill press or tapping device.
Finest for VERSATILITY: Taps anything from soap to nickel steel without pressure on tap—prolongs tap life.
Finest for ADAPTABILITY: Five sizes, standard or built-in models, will fit any drill press or tapping device. 0-1½" cap.
Finest for MAINTENANCE: Requires little or no maintenance.

TORQOMATICS, when used with Jarvis TAPS, make the finest possible combination for low-cost, high-quality tapping. Send for free, illustrated, descriptive literature to The Charles L. Jarvis Co., Middletown, Conn.

THE CHARLES L. JARVIS CO.
MIDDLETOWN IN CONNECTICUT

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-119

NEW BIG CATALOG

NOBLE & STANTON STANDARD

JIG & FIXTURE COMPONENTS



Finest Quality Standards for Your Tooling Program at New Low Prices!

66 PAGES

150 DRAWINGS

Hundreds of new sizes and parts. Many exclusive items not available elsewhere. Advanced engineering features.

SEND FOR YOUR FREE COPY NOW!

STANDARD PARTS CO.

1012 BROADWAY • BEDFORD, OHIO

Please send your NEW CATALOG of Standard Jig and Fixture Components

NAME_____

TITLE_____

COMPANY_____

STREET_____

CITY_____ STATE_____

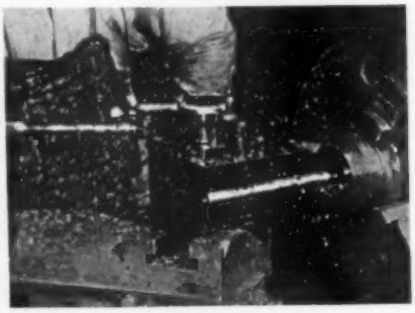
INDICATE A-10-120-1

Tool Block

A different approach to solution of many of the problems involved in engine lathe operation is provided by a new block called Marvic, which is said to put engine lathe operation on a productivity basis comparable with turret lathe operation.

Basically, it consists of a 4-faced block and 5 basic toolholders. The tool block is mounted quickly and easily on any engine lathe. It is rock-solid, permitting deep cuts, without chatter and without tool breakage. It permits full power operation of the lathe.

Each of the four machine-finished faces has dovetail channels. The tool-



holders fit these channels and are positively locked in any one of the four faces, without changing block position.

During the course of a job, the tool and holder may be removed instantly; another tool and holder substituted for the next operation, then the original tool and holder replaced and instantly locked in position for a repeat. Thus, operation is many times faster than using individual conventional holders.

The four faces of the Marvic block permit the machinist to work closer to the chuck or tail stock. Boring, drilling, reaming and tapping are done with perfect alignment. The full swing of the lathe may be utilized.

Three sizes of multiple tool blocks, each with five basic toolholders, are available and match the capacity of the individual lathe.

The block is manufactured by Marvic, Inc., 350 Peninsular Ave., San Mateo, Calif. **T-10-1201**

Heavy-Duty Clamps

Erico Products, Inc., 2070 E. 61st Place, Cleveland 3, has introduced a toggle clamp with double clamping pressure. According to the manufacturer, several advantages have been incorporated into the design. It has up to triple the bearing surface usually available; all welded construction, and it cannot come apart even after pins become worn. The reinforced clamp bar avoids the usual weak point where the pivot pins pass through the bar.

T-10-1202



Are you interested in saving up to 50% in your inspection time, also extending for many years the useful life of expensive gage blocks?

The above is being accomplished in many of the largest manufacturing companies in the country by the use of the Pioneer Tool gage block jack.

•

Designers and manufacturers of tools, dies, gages, fixtures, special machines, optical checking equipment and precision instrumentation parts.

PIONEER TOOL & ENG. CO.

3914-18 W. Shakespeare Ave.

Chicago 47, Illinois

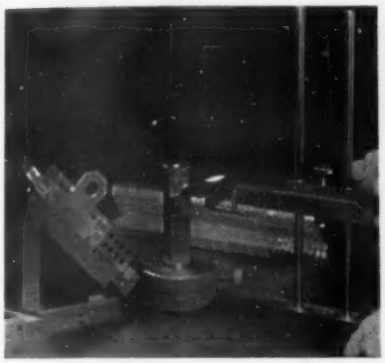
INDICATE A-10-120-2

Height Gage

Faster, accurate precison inspection and layout work are said to be among the advantages provided by an indicator height gage and an adjustable inspection block, developed by Tietzmann Tool Corp., Englewood, Ohio. The indicator height gage, set to master parts or standard gage blocks, is a precision instrument which can be quickly adjusted to approximate height and positively locked in place.

The indicator assembly travels freely on two vertical parallel rods and is locked to both rods with a knurled thumb nut conveniently located between the rods. This inherently rigid construction assures a positive, unchanging setting. Final adjustments in millionths of an inch are possible by a slight turn of the adjusting screw, and can be made in a fraction of the time required by former methods.

The adjustable inspection block is



said to greatly reduce inspection time by avoiding time-consuming trial-and-error readings of the height gage. It also is adjustable in millionths of an inch through a range of 0.250 inch vertically. The large, 1¾-inch diameter anvil may be raised or lowered quickly with a micrometer thread knurled thumb screw assuring quick, positive setting without bumping or tapping. Top and bottom surfaces of block and surface of anvil are ground and lapped perfectly parallel to assure accuracy.

T-10-1211

Bevel Protractor

A stainless steel universal bevel protractor with vernier, which features an acute angle attachment for fast setting of fine acute angles and a new design detachable base which keeps the tool in an upright position at all times, has been announced by Mercury Supply Co., 410 Fairview, Elmhurst, Ill.

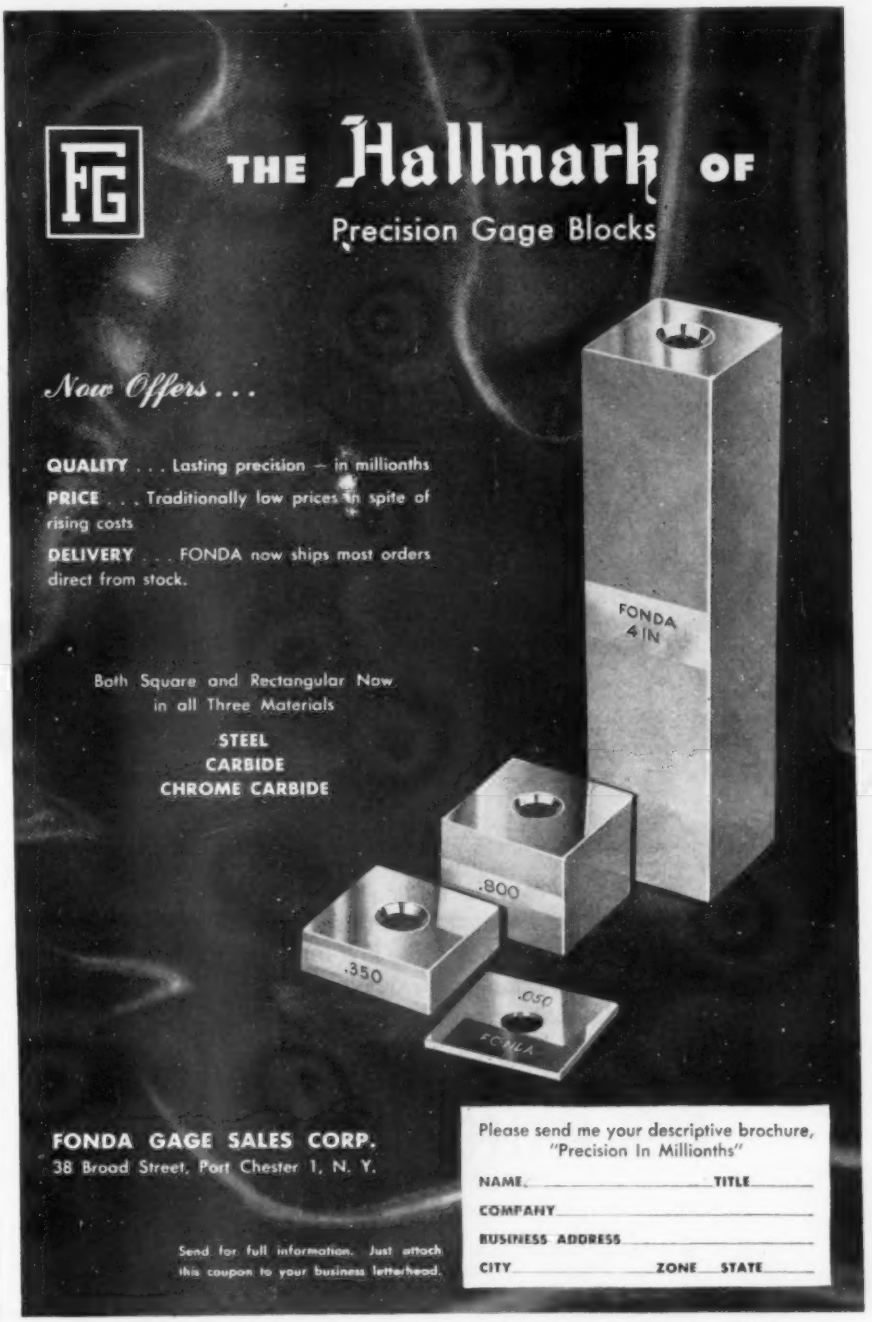
The acute angle attachment attaches to base line of the protractor, from which all graduations are taken, thus avoiding all accumulated errors. The eccentric clamping and releasing mechanism allows free sliding of attachment and fast setting of fine acute angles.



Base of the tool permits measurement around a shaft or other curved part which heretofore was not possible. The base is ground on all surfaces. It is fastened to the protractor with an eccentric clamping and releasing device.

It is said that this protractor gives accurate readings over full 360 degrees to 5 minutes (1/12 degree) from clear-cut graduation lines that are recessed to eliminate wear. Mercury eccentric clamping and releasing mechanism holds blades independent of firm-holding thumbnut, permitting blades to slide along their full length. There are no projections on the back side to hinder paper layout work. **T-10-1212**

USE READER SERVICE CARD ON PAGE 105 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION



FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-121

Four Standard Thread Rolling Attachments

REED RTD CO

For more than 100 sizes of machines

For more than 300 cross slide applications



Select the one you need...

Operating from the cross slides of automatic screw machines, each size of attachment is adjustable to accommodate an infinite range of work diameters within its capacity. Maximum thread rolling capacity within the tooling sector of over 100 sizes of single and multiple spindle automatic screw machines is possible through the selection of one of the four standard attachments. A large assortment of adapters are available that permit more than 300 cross slide applications.

Send us specifications of your requirements and let us supply you with complete information.

REED ROLLED THREAD DIE CO.

THREAD ROLLING MACHINES and DIES • KNURLS • THREAD ROLLS
Worcester, Massachusetts, U. S. A.

Sales Offices in: Buffalo, Chicago, Cleveland, Compton, Calif., Detroit, Englewood, N. J., Houston, Indianapolis, Milwaukee, Montreal, New York City, Philadelphia, Pittsburgh, St. Louis, Syracuse, Toronto

028

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-122

Press and Machine Vises

A complete line of drill press and machine vises in jaw widths of 3, 4½ and 6 inches has been announced by The Wilton Tool Mfg. Co., 925-941 Wrightwood Ave., Chicago 14.

These tools are built to close tolerances, and their comparatively simple design has eliminated "dead weight."

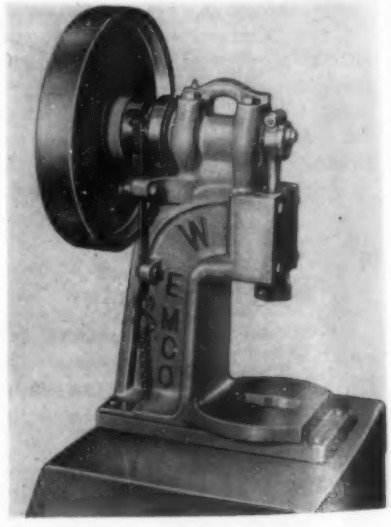
Main parts are cast of high-grade grey iron, and the vises are fitted with a precision cut Acme spindle. Since all sides of the drill press and machine vises are fully machined, they may be used flat or on either side, thus there is no need to remove the workpieces. Jaws have vertical and horizontal V-grooves for the clamping of rounds.

Two slide bars are made of heavy gage cold-rolled steel, giving the vises extra strength and smooth travel, so that they are strong enough for use on any machining operation.

Removable hardened steel jaw plates are available at extra costs. The 6-inch vise has removable crank handle; the 4½-inch model has slide bar handle in addition to hex-head for wrench tightening. **T-10-1221**

Improved Punch Presses

The Klaas Machine & Manufacturing Co., 4314 East 49th St., Cleveland 9, has announced improved redesign of its Emco line of bench type power punch presses to afford increased die space or "window height" by elimination of the radius in the column. In addition, a new clamping device, consisting of a tool steel block and bolt, has been introduced in the ram, affording a more rigid grip and doing away with setscrews. **T-10-1222**

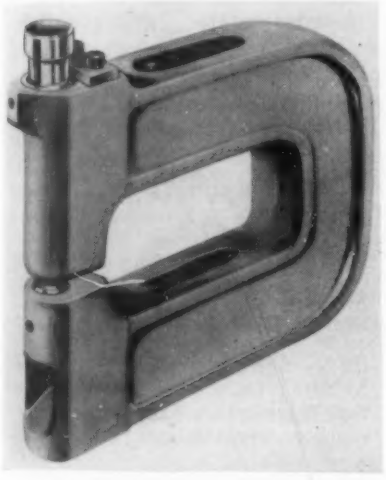


USE READER SERVICE CARD ON PAGE 105 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

Hole Punching Units

A line of hole piercing units and notching units called Toolsets are being manufactured by Toolset, Div. of General Riveters, Inc., 777 Hertel Ave., Buffalo 7, N. Y. Self-contained hole punching units, they can be mounted on the lower bed of a press, thus eliminating customary die sets. The press merely furnishes the force to drive the punch through the workpiece. A free floating punch and guide transmits the load of stripping directly on the work instead of the upper arm of the holder. The punch and die are permanently and automatically aligned in the holder, thereby avoiding time consuming alignment of punches and dies in conventional die sets.

Toolsets can be set up in any desired pattern by bolting the holder in position on a mounting template, or by



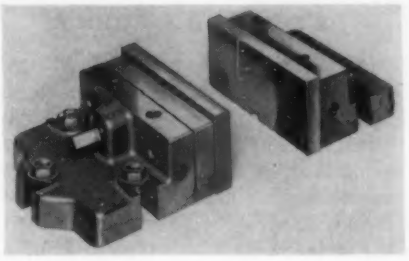
locating and locking in a T slotted plate. A further savings is claimed by the maker due to the fact that the units can be reused in any number of setups. Each holder accommodates a number of punch sizes which can be interchanged to suit the job requirements.

Several advantages claimed for the tool include easy assembly and disassembly without special tools, attainment of closer hole centers, fast setup, long spring life, complete interchangeability of punches and dies, and low maintenance. **T-10-1231**

Vise Set

A two-piece vise set has been introduced by Rockford Engineered Products Co., 2324 Twenty-Third Ave., Rockford, Ill. It consists of two independent members which, when used together on a T slot table, form a vise that is said to provide a number of advantages not offered in standard one-piece vises.

Among these are: greater capacity, since opening of the vise is limited to



length of machine table and not vise; more rigid, since work locates closer to machine table; greater accuracy, since soft jaws locate on machine table and can be keyed to T slots for positive alignment; and light weight, which means easier, safer handling than one-piece vises of less capacity.

In addition, it serves multiple functions, such as a general purpose vise; a fixture for milling slots, flats and keyways on shafts between center, by merely using two jaws equipped with centers and keyed in alignment to T slot; as rigid base that can be used an an angle block; and also as a clamp base to be used as a separate clamping device to hold work against stops. Eight conveniently placed tapped holes are provided for use with hold-down straps, stops, etc. **T-10-1232**

High-Temperature Ceramic

AlSiMag 539, a recently introduced ceramic, is offered as an excellent material for fixtures, jigs and work-holding devices for fast production line handling of brazing, welding, electronic heating, flame polishing. It also is suggested as a material for making pins, pads, plates, spacers and kiln furniture for high temperature sintering operations. Nozzles for welding tips and other extreme high temperature devices have given outstanding performance, according to its makers.

The ceramic is a relatively fine-grained silicon carbide material, however, due to the difficulties of machining this highly abrasive material, there are some limitations on the manufacture of complicated shapes.

Where high temperatures are involved or where rapid thermal changes occur, this material seems to have several superior properties. It has been repeatedly heated white hot and quenched in dry ice without fracturing. Test disks of this material are sent without charge. Request them from American Lava Corp., Chattanooga 5, Tenn. **T-10-1233**

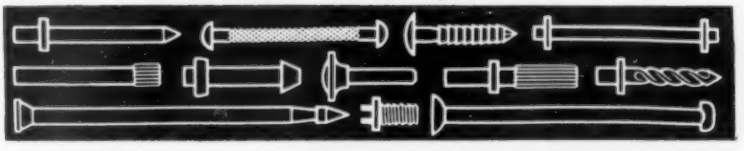
WRITE FOR Hassall FREE fastener catalog



A complete, comprehensive handbook on cold-headed nails, rivets, screws and other special fasteners. Check on ways to improve your assembly cost-wise, appearance-wise and from a standpoint of maximum effectiveness at minimum cost. One hundred years of experience are at your service. Write for price quotations or for suggestions on the redesigning of your present assembly.

Hassall ESTABLISHED 1850

JOHN HASSALL, INC. P. O. BOX 2185 WESTBURY, N. Y.



FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-123

SEND FOR THIS FOLDER and DATA SHEETS



IT'S THE LONG STROKE UNIT!

12" stroke on base only 16⅜" long. Or smaller model, 9" on 13⅜" base. LONG STROKE makes it easy to change tools. TRAVERSE RATE over 400" min., FEED RATE up to 30" min. CAPACITY ½" in steel.

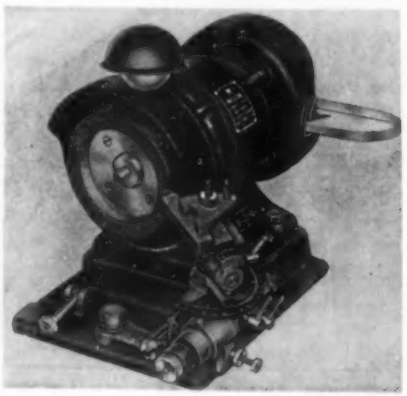
Self-contained, completely hydraulic. Unusually accurate and dependable. Especially adapted to use on transfer machines. For catalog-folder and data sheets, write **DRILLUNIT, INC., 637 Mt. Elliott, Detroit 7, Mich.**

INDICATE A-10-124-1

Precision Grinder

A moderate-priced Model AP precision grinder designed to produce perfect keen cutting edges and exact angles on all types of modern cutting tools such as carbide, stellite and high speed steel has been announced by Thomas Prosser & Son, 120 Wall St., New York. According to the makers, this type of grinding has previously been possible only on higher-priced and complicated machines.

Several advantageous features are claimed for the grinder, primary of which is the saving in diamond wheels —the tool is rocked back and forth across the entire wheel face, thus avoiding scoring and grooving of the wheels, and thereby increasing their life. Real precision is achieved since all front, side and top angles can be set accurately in both vertical and horizontal planes.



Feed of the tool toward the grinding wheel is controlled by a micrometer feed knob graduated in thousandths of an inch.

By eliminating rigid pressure and localized overheating, thus reducing the danger of cracks, the tool provides saving in valuable hard cutting tools. Keen durable straight cutting edges are produced with mirror finish, and ground to exact angles. This advantage is possible even with unskilled operators on the machine, the company states.

One side of the grinder is equipped with a quick-acting indexing table, which can be set quickly and accurately to a required angle, and which remains fixed in position without need of a locking device. Tools can be rapidly rough-ground by hand on a vitrified wheel, to a slightly greater angle than the final finish angle, then only a slight amount of grinding is necessary on the finishing wheel using the precision reciprocating-action tool holder to obtain desired angles, edges and finish. The finishing wheel can be vitrified or diamond.

Complete information on all details of the unit are discussed in a brochure available from the company. **T-10-1241**

Producers Pare Stamping Costs

Modern Coil Handling Equipment Widens Use of Low Cost Coil Stock

The battle to keep down costs is going well for producers of stampings. Coil stock and modern coil handling equipment are the decisive factors. Coil stock, with only two scrap ends to its entire length is far more economical than strips of straight stock with two scrap ends to every ten feet. Moreover, the type of coil loading and handling equipment built by F. J. Littell Machine Co. makes coil stock easier to handle than straight stock. Stamping producers are taking full advantage of these developments. Coil stock and Littell Coil Hooks, Reels, Straightening Machines and Automatic Roll Feeds are in wider use today than ever before.

Hooks Serve Two Ways



. . . Littell Hooks make it a simple matter to unload coils on delivery, and to load reels. The variety of sizes have lifting capacities from 1,000 to 40,000 pounds.

Two Types of Reels . . .



Littell Coil Cradle Reels mount heavy coils, up to 30,000 pounds. Spindle Reels handle coils up to 40,000 pounds. Each type is available in plain or motor driven designs.

Straighteners Flatten Stock... Removing curvature from coil stock as it passes from reel to punch press die is the function of Littell Straightening Machines. All models are the same basic design. Variation is in the number and diameter of straightening rollers employed . . . from 1" to 90" in width, and from .010" to .125" thickness.



Automatic Roll Feeds . . . Press output in many shops has been multiplied five times by simply attaching Littell Roll Feeds to presses for blanking, drawing, piercing, or cut-off work. The Littell Roll Feed is used with compound dies, single station dies, and progressive dies. Standard models are easily attached, serve all types of presses, and handle all standard widths and thicknesses of stock.

Descriptive details and prices on Littell Hooks, Reels, Straighteners and Roll Feeds are available on request. Inquiries are given immediate attention when addressed to

F. J. Littell Machine Co.
4199 N. RAVENSWOOD AVE.
CHICAGO 13, ILL.
INDICATE A-10-124-2

Automatic Air Feed

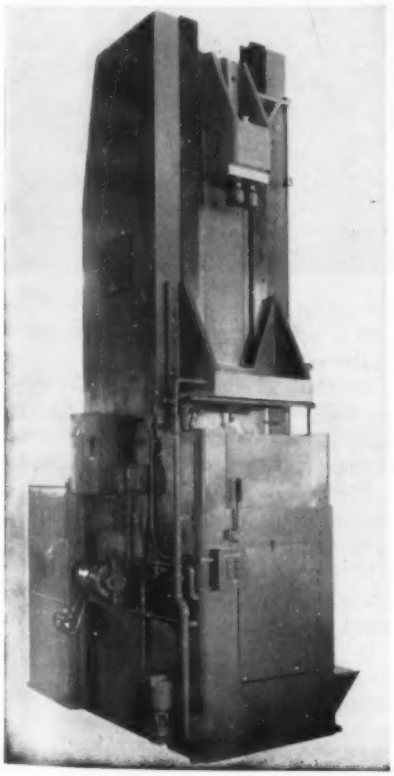
machine. At the complet

Hydraulic Broaching Machine

The vertical internal pull-up hydraulic broaching machine recently presented by Acme Broach Corp., Milan, Mich., features adjustable cutting speed and quick, convenient stroke adjustment with two control lever arrangement as standard. This provision requires the use of both operator's hands as a safety feature and in addition provides a sensitive "feel" to the operator, which is especially important in setting up and starting new broaches or changing from one job to another. Electric controls for machines may be supplied if desired.

The line of machines comes in a range of sizes from six-ton capacity, 36-inch stroke, to 30-ton capacity with 60-inch stroke.

The main drive motor and hydraulic pump for pull cylinder are housed in the upper portion of fabrication, in back of machine column, along with a relief valve where they may readily be reached for adjustment and servicing. The lower section houses a hydraulic reservoir. A separate motor, hydraulic pump and control is provided for quick action of the lower broach elevator cylinder. A gusher type coolant pump with individual control is attached and provision is made for supplying an adequate flow of coolant or cutting oil to the broaches below the work table for cutting purposes as well as above the work table to wash chips from the broaching tools.



The machine shown is arranged to handle two broaches at a time; however, larger parts may be broached using a single broach and in the case of rather small parts, four or more parts may often be broached simultaneously. In operation the operator drops parts over the top shank end of the broaches and upon actuating the control lever the broaches are raised up through the work bushings in the stationary work table and into the broach pullers. The control lever for the main cylinder is then thrown and the broaches drawn upward through the cutting stroke, and the finished parts drop a short distance onto an angular table allowing cutting oil to drain from them. The broaches are then returned downward into the lower elevator bushings and the lower elevator run down into loading position at which time two more parts are placed over the broach shanks in preparation for another cutting stroke.

T-10-1251

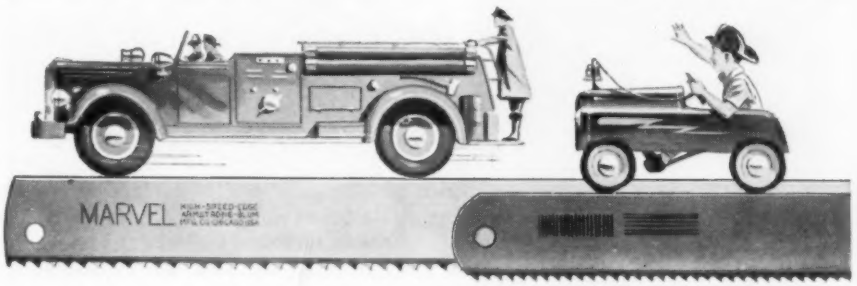
Cold Process Solder

A plastic metal base cold process solder for filling imperfections in castings, patterns, machinery, and other metal surfaces has been announced by The Woodhill Chemical Co., 1391 East 33rd St., Cleveland.

Duro Solderweld No. 53 is a metallic plastic in putty form. The solder is applied cold, just as it comes from the container, and may be applied with simply a spatula or putty knife. It dries to a metal hardness when exposed to the air, drying time depending on how thickly the solder is applied (about 20 minutes if room temperature is 70 degrees or warmer). When dry, it can be ground filed, or sanded down to a level feather edge. No skill or special tools are required in its use.

A particular feature is that this improved product will flex. Further, it is guaranteed not to harden or congeal in the can. Samples are available by writing to the manufacturer.

T-10-1252



. . . but

Experience Cannot be Copied

More than a quarter-century ago MARVEL invented and basically patented the MARVEL High-Speed-Edge Hack Saw Blade—the UNBREAKABLE blade that increased hack sawing efficiency many-fold.

Every MARVEL Hack Saw Blade ever sold has been of that basic welded high-speed-edge construction, with constant improvements from year to year, as EXPERIENCE augmented the "know-how" . . .

MARVEL is not "tied" to any single source of steel supply, and has always used the best high speed steels that became available from time to time as metallurgy progressed. When-as-and-if finer steels are developed—and are proven commercially practical for welded-edge hack saw blades—MARVEL will use them, regardless of cost or source . . .

There is only one genuine MARVEL High-Speed-Edge! All other "composite" or "welded-edge" hack saw blades are merely flattering attempts to imitate—without the "know-how" of MARVEL EXPERIENCE . . .

Insist upon *genuine* MARVEL High-Speed-Edge when buying hack saw blades—and be SAFE, for you can depend upon MARVEL. They have been "tested", "pre-tested", and "re-tested" by thousands of users for more than a quarter-century!

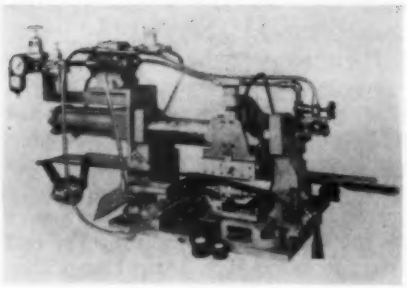
Metal Cutting MARVEL SAWS
Better Machines—Better Blades

ARMSTRONG-BLUM MFG. CO. • 5700 Bloomingdale Ave. • Chicago 39, U. S. A.
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-125

Automatic Air Feed

An air-operated assembly, combining the feeding of parts, the actual marking of them and then the ejection—automatically, has been developed and added to the Series 9AA Marking machines produced by The Acromark Co., 607 Morrell St., Elizabeth, N. J.

Operated from standard airlines used in most shops, this arrangement provides essentially automatic production marking on plastic, metal or other material. For plastic marking of tubular, cylindrical or round objects, the parts roll down an inclined runway, are fed



under the marking die by air pressure, then are marked and ejected.

The valve controlling the feed is actuated by each stroke of the marking machine. At the completion of each stroke another valve is opened providing air pressure to remove the marked part.

When plastic parts are marked, an electric heating element provides heat to warm the die to a thermostatically controlled temperature. A roll leaf or color transfer tape feed is carrid over the part to provide the color. This, too, is actuated by each stroke of the air-operated marking machine.

Metal marking is accomplished in the same machine and in the same manner without the use of the heating element and roll leaf feed. Marking speeds of 40 or more marked pieces per minute are readily obtained.

Over-all dimensions of the model 9AA marking machine with this assembly, are approximately 30 inches long by 21 inchs high by 14 inches deep.

T-10-1261

Saw Attachment

A cam-action saw attachment has been developed by the E-Z Way Tool Co., Barrington, Ill., to convert the rotary power of an electric drill to a thrust-action saw, eliminating the use of gears.

The tool can be attached directly to any heavy-duty electric drill for fast-cutting of metal—including stainless steel, plaster, nails, transite, masonite, lath, plastic or other materials. Each



revolution of the power drill is turned into a 7/8-inch stroke by the cam action of the saw.

Specially designed blades make starting holes unnecessary, but the E-Z saw universal chuck also permits the use of any make of hack or keyhole saw blade.

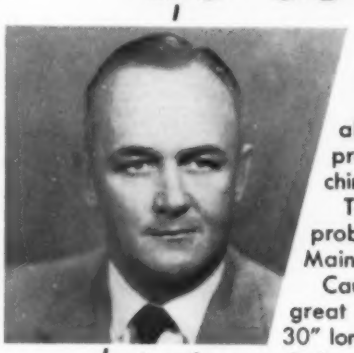
Precision-built of cast aluminum and special alloy steel, the attachment is light and easy to handle. An adjustable guide handle permits safe, efficient work in normally inaccessible spots.

In addition, attachment eliminates the need for slow manual or torch cutting and leaves a trim, smooth edge, according to the manufacturer.

T-10-1262

he sets 'em up...

for speed and accuracy!



Erickson field engineers, like Dick Butts above, are trained to get the utmost in production and accuracy from your machine tools.

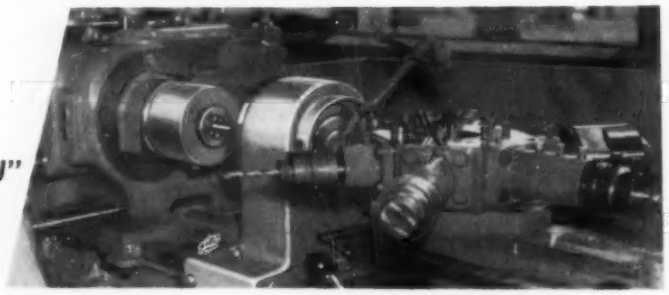
Typical is the solution to a "precision" problem at Saco-Lowell Shops of Biddeford, Maine . . . manufacturers of textile machinery. Cause of lost accuracy was an unusually great diameter-to-length ratio on rolls 24" to 30" long. They must fit perfectly when threaded together on spinning frames up to 52' long. Machining consists of drilling, reaming, and tapping to a .004" TIR from thread P.D. to roll O.D.

Accuracy is now rigidly held by use of Erickson Speed Chucks as both headstock and steady-rest. A report from Saco-Lowell states:

"By use of Erickson chucks on both spindle and auxiliary support, we increase quality, reduce handling time and reduce set-up time when changing to other sizes."

Erickson's technical staff can develop the correct solution to your tool and work holding problems.

Write for Catalog "J" Today



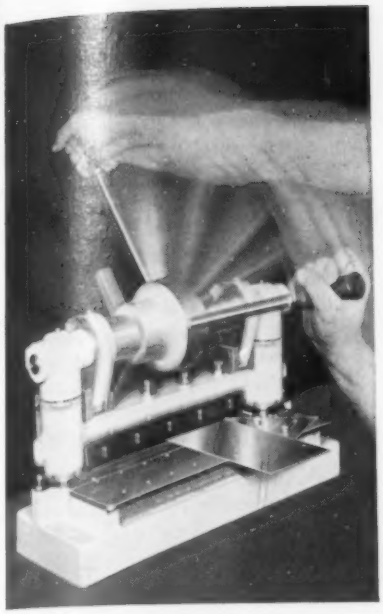
ERICKSON TOOL COMPANY

2316M **HAMILTON AVE.** • **CLEVELAND 14, OHIO**

COLLET CHUCKS . TAP CHUCKS . FLOATING HOLDERS
EXPANDING MANDRELS . AIR CHUCKS . SPEED INDEXERS

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-126

ing, after each shell is



Want PRECISION SHEARING at HIGH SPEED?

Check these features and you'll want a DI-ACRO* SHEAR

- **PRECISION** — strips less than .025" wide accurately sheared. Thousands of parts exactly duplicated.
- **CUTTING SPEED**—rivals that of power machines.
- **RATED CAPACITY**—16 gauge.
- **EASY TO OPERATE**—a woman can operate it.
- **CHOICE OF MODELS**—available in four sizes. Widths from 6 to 24 inches. Four power models also available.
- **ENGINEERING SERVICE**—always at your disposal.
- **PORTABLE**—readily moved.
- **RUGGEDLY BUILT**—backed by one year warranty.
- **DELIVERY**—immediate on most models.
- **COST**—that's good too.

*pronounced Die-ack-ro

METALS RUBBER MICA FIBRE PLASTIC LEATHER SCREEN MESH

LIKE MORE INFORMATION?

Send for 32-page catalog

Gives full details on both hand and power operated Di-Acro Shears, Benders, Brakes, Notchers, Punch Presses, Rod Parters and Rollers. Mail your request today.

Creators of "DIE-LESS DUPLICATING"

di-acro PRECISION METALWORKING MACHINES

O'NEIL-IRWIN MFG. CO.
375 8th AVE.
LAKE CITY, MINN.

INDICATE A-10-127-1

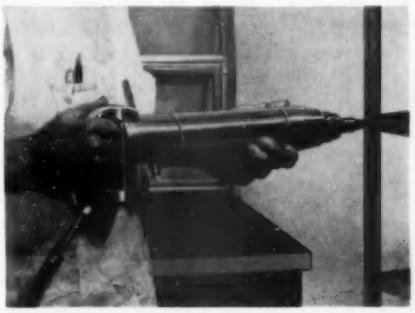
Portable Riveter

The Lemert Engineering Co. of Plymouth, Ind. has introduced an unusual portable pneumatic riveter (Airflex Model SP) with rotating impact.

The compact and balanced hand tool embodies all the important advantages of the Airflex principle of spin riveting.

Operation involves a straight-line pneumatic hammer which strikes against a pneumatic-rotated peen distributing the impacts around the rivet head. It is equipped with a valve which enables the operator to regulate the force and rapidity of the blows, as well as the spinning speed of the peen.

Extensive tests made prior to introduction of this riveter showed that it requires only a slight steady pressure for proper operation; riveter tends to feed itself. The spinning action eliminates any extreme jumping and contributes to its extra smooth operation.



According to the manufacturer, the hand tool easily gets into hard-to-reach places and unusual positions. Since it does not require elaborate fixtures, the portable riveter permits quality riveting on short pilot-run jobs, saves on handling and setup time, speeds up production. It can be used safely on fragile as well as ordinary materials.

Containing only 26 parts, the new tool weighs seven lb and measures 15 inches in length.

For complete information regarding the new Airflex tool, write for Builetin No. 85A Lemert Engineering Co., Inc., 201 Jefferson, Plymouth, Ind. **T-10-1271**

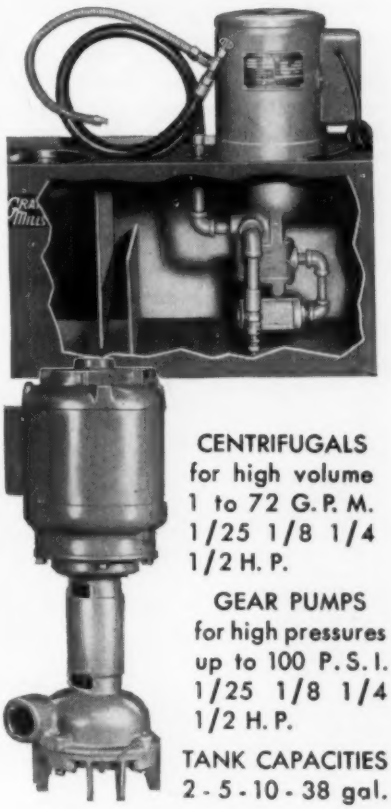
Graphite Rods

Graphite rods for automatic rectification of electric salt bath furnaces for high-speed steel heat treating have been announced by the Stackpole Carbon Co., St. Marys, Pa. Decarburization of the work is avoided. Electrode life is materially prolonged and the salt bath does not have to be renewed so often. The graphite rods do not cause any sludge formation. Better bath circulation thus obtained results in from 10 to 25 percent faster heating.

Catalog 40A may be obtained by letterhead request to the manufacturer.

T-10-1272

There's a husky Dependable GRAYMILLS Coolant Pump or complete unit for ALL Machine Tools



CENTRIFUGALS
for high volume
1 to 72 G. P. M.
1/25 1/8 1/4
1/2 H. P.

GEAR PUMPS
for high pressures
up to 100 P. S. I.
1/25 1/8 1/4
1/2 H. P.

TANK CAPACITIES
2 - 5 - 10 - 38 gal.

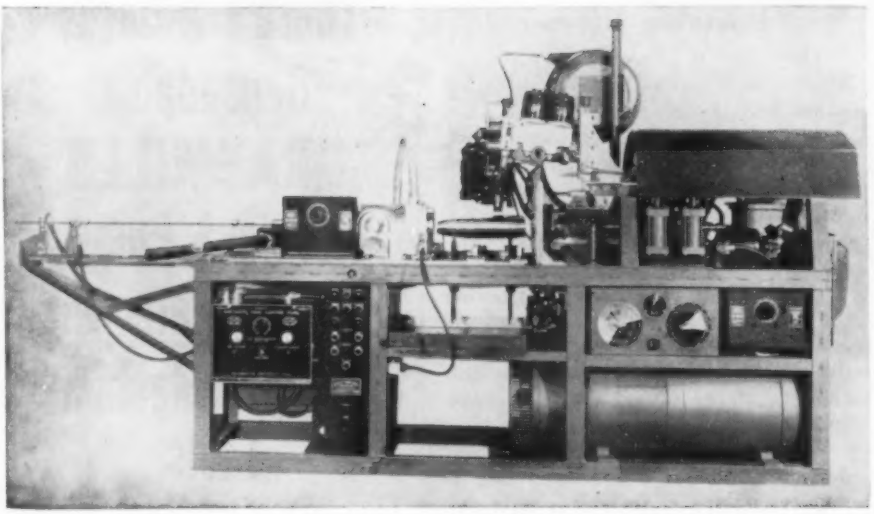
Industrial Distributors Stock Standard Models

Send for the new GRAYMILLS catalog with easy to use selection chart.

GRAY MILLS

GRAYMILLS CORPORATION
3729 North Lincoln Avenue, Chicago 13, Illinois
West Coast Offices and Warehouses — 4511 Melrose Ave., Los Angeles; 538 Polk St., San Francisco; 8030 Fortieth Ave., N. E., Seattle 5.

INDICATE A-10-127-2



Projectile Welding

A universal welding machine for projectiles, the Morley Model "F", has been recently developed by the Morley Machinery Corp. of Rochester, N. Y. It makes use of a standard welding head which uses a continuously consumable electrode. This head can be easily adjusted with respect to the shell.

A diversity of rotating bands can be applied by either a spiral or index feed of the head while the shell is rotated between self-centering chucking adapters. Complete versatility of speeds and feeds is provided. The welding generator is incorporated in the frame of the machine making it an all-inclusive unit.

Compressed air or water cooling of the work is provided through a cooling tube synchronized with the welding head. Automatic loading and unloading, after each shell is processed, makes the machine suitable for production line work. The consumable electrode can be of various metals, including iron and copper, which must conform to the shell specifications.

This principle of applying rotating bands is adaptable to projectiles manufactured by the Army and the Navy only if authorized in the Government specifications.

This equipment is also adaptable to increasing the diameter of cylindrical parts by welding. **T-10-1281**

Fluxing Compound

A fluxing compound for use in soldering aluminum has been introduced by the Essex Wire Corp. Differing from conventional fluxes, this product, known as S-X Aluma-Flux, now makes possible the noncorrosive soldering of aluminum alloys, with the exception of a few containing high percentages of silicon. In addition, it is suitable for the joining of aluminum to other metals. It may be used for manual, dip or mechanical production soldering operations, either in powdered form as delivered, or in molten form.

During several months of tests by Battelle Memorial Institute, Aluma-Flux proved to be a universal flux, equally effective for soldering stainless steel, bare and galvanized carbon steel, cast iron and all other ferrous metals, copper, brass and nickel and other commercial metals commonly joined by soldering as well as the coating of copper with tin and the joining of unlike metals.

Soldered joints in aluminum produced no corrosive action due to flux residue when exposed to salt spray, high humidity, alkaline water, etc. Neither was there any detrimental effect on the joined surfaces over protracted periods.

Aluma-Flux may be stored in powdered form or maintained in molten form indefinitely with no impairment of fluxing efficiency, and without any change in weight, or chemical and physical properties. Being nonhygroscopic, Aluma-Flux will not absorb moisture in any normal atmospheric condition.

Aluma-Flux is being distributed nationally by Insulation and Wires Inc. Complete technical and application data may be obtained by writing them at 3435 Chouteau Ave., St. Louis 3.
T-10-1282

USE READER SERVICE CARD ON PAGE 105 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION



Gages available for checking "O" Ring, Truarc and other retaining ring grooves.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-128

Jig Vise

For consistant, accurate clamping for repetitive machining operations, Suprecision Products, 2447 Nicollet Ave., Minneapolis 4, Minn. has introduced its powered-air jig vise.

The company outlines several advantages of the equipment: (1) increased production due to the open front design to permit easy setting and removal of work, reduced operator fatigue with consequent maintenance of work pace, possibility of permanently clamping jig vise into position for constant line work; (2) economy of time and money through instantaneous response of



clamping plate, easy movement and greater flexibility; (3) dependability and accuracy; (4) lack of maintenance requirements since all moving parts are enclosed for protection against chips and foreign matter plus an exclusive grease pocket system which reduces lubricating maintenance; (5) versatility and adaptability to numerous uses.

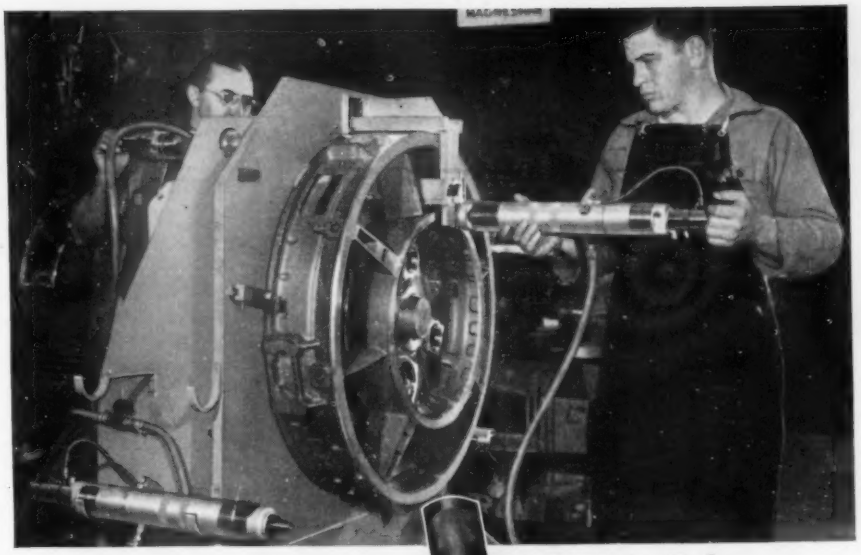
Clamping pressure is ten times air-line pressure, and varying the air-line pressure, can control the clamping pressure. The double-acting air cylinder exerts equal pressure and speed in either direction. The jig vise can be actuated from either left or right side, or integrated with a machine for mechanical operation. **T-10-1291**

Oil Compound

Elimination of the need for side clearance on slotting saws, along with an increase in the efficiency of high-speed slotting operations, has been made possible with an oil compound which is said to have rapid penetration and fast wash and also extreme pressure qualities. Known by the formula "Vantrol 5468A," it has been field tested by the Van Straaten Chemical Co., Chicago.

A Field Research Engineering report is available from the company.

T-10-1292



ANOTHER EXAMPLE OF *KELLER Air Tools engineered to industry*

USE KELLER *Airfeedrills* for accurate automatic drilling

Keller Airfeedrills are recommended where extreme accuracy is needed, especially where the job cannot justify the space or cost of expensive machine tools; as in the case shown above where Keller Airfeedrills make the locating holes for machining jet engine parts . . . work which must be done to extremely close tolerances. Note the inexpensive fixture required.

Used on close centers and in tight places

Easily shifted from job to job

Drills metal, wood, composition, plastics

Facts in Brief about Keller Airfeedrills

Accurate holes without costly fixtures

Attaches in any position, at any angle

Air operated—hydraulically controlled

Pneumatic cycling to speed production

Keller Tool Company, Grand Haven, Mich.

Please send me a free copy of your booklet titled, "The HOLE Story of the Keller Airfeedrill."

Name_____

Title_____

Company_____

Address_____

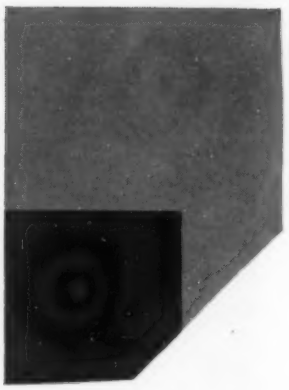
City_____ Zone____ State_____



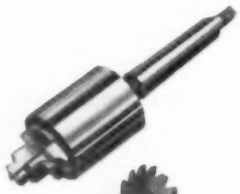
Send for FREE 24 Page Booklet for more information about automatic drilling with Keller Airfeedrills

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-129

for Special Service
on Carbide "Specials"



GORHAM

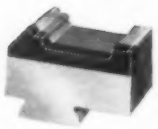


GORHAM

GORHAM



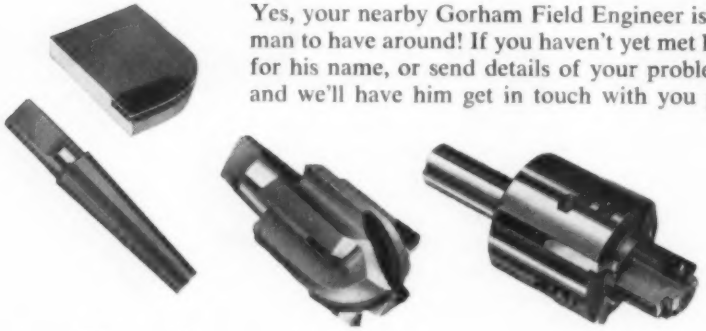
When your production machining problem dictates the use of special carbide tooling, your nearby Gorham Field Engineer can give you the right answers fast! He's an expert in the design and application of special cutting tools . . . and he provides a complete engineering service to determine your exact requirements.



He begins with your product, sketch or idea. He surveys your production operations and available equipment. He considers work material properties and required finishes and tolerances. He plots speeds, feeds and methods of tool driving. Then he develops practical design and metallurgical specifications for a special tool that's "tailor-made" for your application. And his recommendations are backed by Gorham's more than thirty years' experience in the design, manufacture and heat treatment of fine cutting tools.



Yes, your nearby Gorham Field Engineer is a helpful man to have around! If you haven't yet met him, write for his name, or send details of your problem direct, and we'll have him get in touch with you promptly.



Gorham TOOL COMPANY

"EVERYTHING IN STANDARD AND SPECIAL CUTTING TOOLS"

14407 WOODROW WILSON • DETROIT 3, MICHIGAN

WEST COAST WAREHOUSE: 576 North Prairie Ave., Hawthorne, Calif.

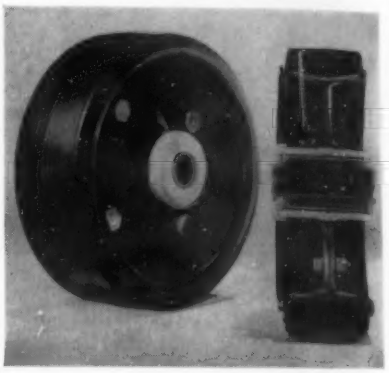
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-130

Demountable Industrial Wheel

An unusual type of demountable industrial wheel with a bonded-to-steel rubber tread that tests show will not slip, stretch, or creep under heavy loads is now being marketed by The Rapids-Standard Company, Inc.

Called the "Rapistan MB," this wheel incorporates exclusive design features which the company claims will increase wheel life substantially and cut costs up to 30 percent compared with regular demountable or molded-on rubber types.

The replaceable tire of the Rapistan MB has a thick live-rubber tread that is bonded for life to a steel inner band. This steel band, unlike canvas or hard-rubber tread backing on many demountables, cannot warp, stretch or spread during molding operations or in use. The tread is of uniform thickness



throughout, which effectively amounts to considerably greater depth as compared to other wheels because there are no thick or thin spots to cut tire life.

A one-piece hub with a retaining ridge that locks the entire assembly to the wheel disks, preventing shifting under side thrust. The Hyatt-type or Timken tapered roller bearings are bathed in grease that feeds from an extra-large reservoir supplied by a Zerk lube fitting. Felt seals and hardened steel hub caps permanently keep the grease in and dirt and water out.

This new wheel is now being manufactured in 6 and 8-inch sizes with a 1⅞-inch width tread in either cushion-rubber or Neoprene. Load rating is 400 and 500 pounds, depending on wheel size.

Full details, prices and literature on this new class of wheel may be requested from The Rapids-Standard Co. Inc., 342 Rapistan Building. Dept. MB, Grand Rapids 2, Mich. **T-10-1301**

USE READER SERVICE CARD ON PAGE 105 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

Technical Digests . . .

Sheet Fabrication:

burr and polish the edges of sheet

Technical Digests...

Production of Titanium Aircraft Parts

New alloys are extending uses as production knowledge of titanium grows.

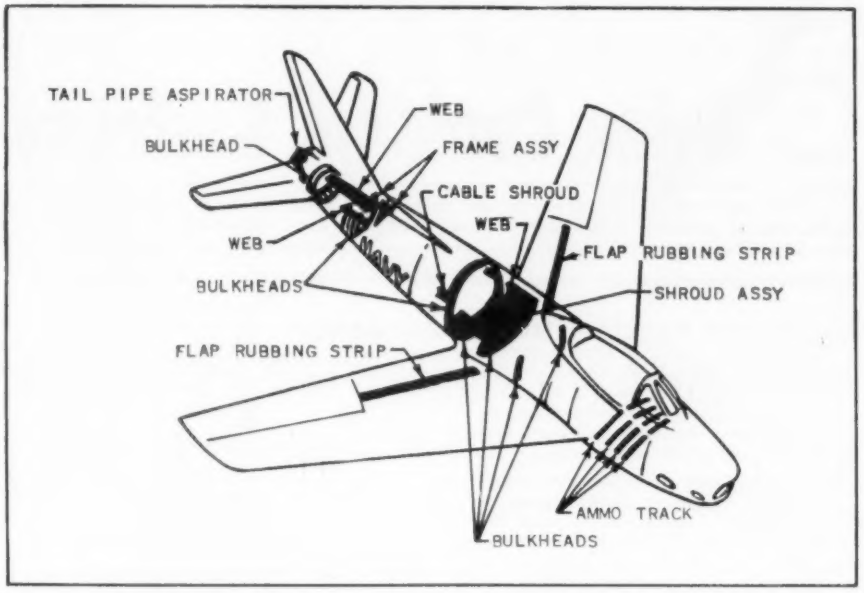
W. L. Finlay, Panel Leader

Rem-Cru Titanium, Inc., Bridgeport, Conn.

In jet engines, titanium is being used chiefly in the compressor in the form of disks and blading; it is also planned for use in sheet-metal parts, such as combustion-chamber liners, etc. The sheet-metal liner is welded construction and has to be made of a titanium alloy, estimated to require 120,000 psi yield strength at room temperature and 60,000 psi at 600 F.

FJ2 Fury North American Aviation is a good example of titanium's production use in jet-fighter airframes. Titanium and its alloys are used in parts subjected to moderate service temperatures of about 250 F, such as fuselage frames and bulkheads alloy, shroud assemblies (cml pure), cable shroud (cml pure), etc. Also, it is used in ammunition tracks (cml pure) and in parts subjected to corrosion like the flap-rubbing strips (cml pure).

Titanium alloys are replacing cold-worked 18-8 and 12 Cr stainless steels, as well as heat-treated steel such as 4340 as disk or wheel materials also.



Parts on North American FJ2 Fury designed to use titanium.

Forging

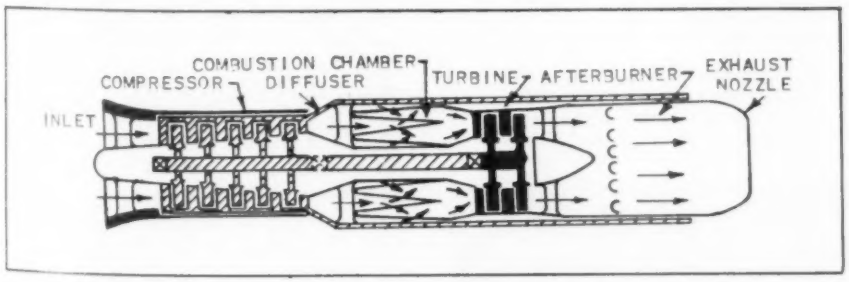
In contrast to early experience with ingots for forging, current ingots are sound and reasonably homogeneous. In general, the interstitials in typical contaminant quantities do not adversely affect forgeability; they may, however, be deleterious to the room and low temperature mechanical properties. Experience indicated that grinding cracks were generally shallow and caused no trouble except for blade forgings which could not be machined.

Welding

In heliarc or argonarc welding, good shielding is a must if ductile welds are to be obtained. Besides using a copper or inert gas back-up, the trailing edge of the welding electrode must have provision for gas shielding in order that the solidification takes place under inert gas. Most production welding can be done in the open, using a gas-shielded arc, if proper precautions are taken. Stabilizing type anneals can improve the ductility of some alpha-beta alloy welds.

Contaminants in welding atmosphere must be avoided. The inert gas must be of high purity in order to obtain uncontaminated welds. Tolerances have not been completely established, but humidity must be less than 5 percent, nitrogen and oxygen less than 1 percent.

Welded titanium can be subsequently fabricated. Welded titanium tubing is cold drawn, as must as 38-percent reduction in a single pass. Flaring of welded titanium must be done hot, however.



Titanium is used or under study for cross sectioned jet engine parts.

Machining:

Causes are not known definitely, but it is believed that alloys which are susceptible to heat treatment are more prone to such cracking. Titanium alloys seem to be more prone to cracking than steel, and more care needs to be

taken to prevent it. Use of elevated-temperature grinding is helpful.

Machining operations on forged disks are common. They are turned, holes are drilled and reamed, grooves are broached, and flush grinding is used on gearing. No serious machining problems are being encountered, but some trouble still is found with small holes less than ¼ inch in diameter and with some milling.

Sheet Fabrication:

For alloy sheet, the trend is definitely toward brake bending and hydropress forming with the work preheated to 600-900 F. The lower temperature is used if the forming is not severe. Unalloyed titanium parts can be formed cold, but for sharp bends, warm forming is recommended too. Radiant heat is used for large sheets. Torch heating is also used, but there is a definite trend toward heated platens. Springback is about 12-13 degrees at room temperature, but only 4-6 degrees at 800 F. It has been found very desirable to deburr and polish the edges of sheet to be brake bent. This is done by draw filing. With the work warm and a bend radius of 3.5T, brake bending can be done with practically no scrap loss. In hydropress operations, 1500 psi, more or less, are used. If the work tends to wrinkle, the lower pressures are used. No lubricant is used in hydropress and rubber pad forming. Punch-press forming is not used much but probably would require lubrication. Lubrication with molybdenum disulfide is used in stretch forming.

Most plants prohibit stamping of any kind. Stress-corrosion cracking of stamped parts in acid has been noted. For dimpling, dies heated to 750 F are used. Dimples formed at temperatures below 600 F are not well defined.

Heat Treatment:

Most of the heat treatments used so far have been to soften titanium alloys, not to harden them. For alpha-beta alloys, the so-called stabilizing heat treatments are used to render the alloys stable against hardening and embrittling during service at elevated temperature or as post-weld heat treatments to eliminate transformation hardening as a result of rapid cooling from welding. Surface hardening of heat-treatable alpha-beta alloys by induction has been done. Hardnesses of 40-45 R_c have been obtained.

From a panel discussion of the SAE Production Forum held during the 1953 SAE Nat'l Aeronautic Meeting.

MOORE SPECIAL TOOL COMPANY

Holes, Contours, Surfaces

Published in the interests of greater accuracy and quality in the toolroom and on the production line by the Moore Special Tool Company, Inc., 734 Union Avenue, Bridgeport 7, Conn., builders of Jig Borers, Jig Grinders, Panto-Graph Wheel Dressers, Die Flippers, Motorized Centers and a complete line of Hole Location Accessories.

ACHIEVING PERMANENCE OF ACCURACY

Just as important as the initial accuracy of a precision machine tool is the *life expectancy* of this accuracy. And the most effective way to insure long-lasting accuracy is to give *dimensional stability* and *wear resistance* special consideration during machine design.

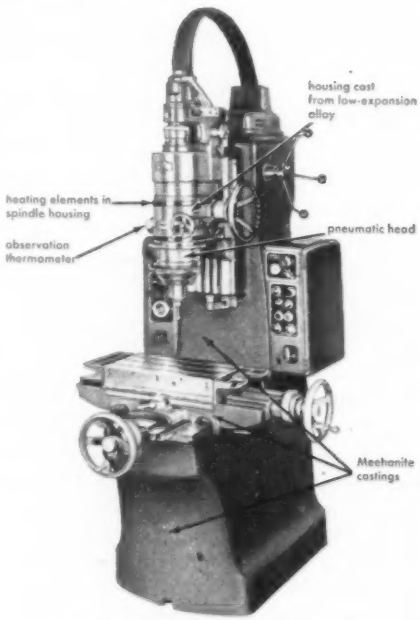
The following causes of dimensional *in*stability are most frequently encountered: thermal expansion, unstable constituents in the material; and stresses in the material. In the design of the No. 2 Moore Jig Grinder, all of these factors were taken into account and special features were incorporated to counteract them.

All the inherent accuracy of a measuring system, capable of positioning the workpiece in relation to the spindle within a tenth, is rendered nearly valueless if the spindle does not retain its position during machining operations. Such movement, caused by thermal expansion, is inevitable unless steps are taken during design to minimize or prevent it.

Electric heating elements were incorporated in the main spindle housing of the Moore Jig Grinder to maintain uniform temperature—whether machine is running or not. An observation thermometer is located so as to indicate any abnormal temperature change within the housing. The housing itself is cast from 36% nickel iron to further minimize effects of temperature variations. And a pneumatic head directs air onto the workpiece, preventing undue temperature rise both in the workpiece and in the locating members of the machine.

Instability resulting from gradual relaxation of locked-in stresses in castings is prevented by suitable stress-relieving cycles during the manufacture of Moore machine components. Similarly, the best way to avoid unstable hardened steel parts is by tempering them. Moore follows this practice.

Further wear resistance was built into the Moore Jig Grinder by means of: adequate way and bearing surface, scientifically proportioned to minimize and distribute wear; all reciprocating parts of nitrided steel—almost as wear-resistant as carbide; pressure lubrication of ways; lead screws and nuts made from nitrided steel and aluminum bronze, respectively, combining to offer low coefficient of friction, abrasion resistance and hardness; and dust protection devices.



Special design features of the No. 2 Moore Jig Grinder insure permanence of accuracy.

ACHIEVING GREATER ACCURACY QUICKLY is the job of Moore Jig Grinders and Moore Jig Borers. Both make possible accurate lead screw settings within .0001". This team will produce precision holes, contours and surfaces *in your shop* at minimum cost. For detailed catalogs, write to: Moore Special Tool Company Inc., 732 Union Avenue, Bridgeport 7, Conn.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-132

▼ ▼ ▼

Used Machinery and Industrial Mobilization

by Arthur M. Johnson

Asst. to the Director, Metalworking Equipment Div., Dept. of Commerce

As is common practice in industry, government owned manufacturing and repair establishments have quantities of idle facilities in their warehouses. This accumulation of machines is not considered obsolete or worn-out. Shop rearrangements and varied workloads also create idle facilities. Shipyards and army arsenals carry a listing of machine tools. This was the origin and basis for the founding of the Departmental Industrial Reserve.

With the end of hostilities of World War II, Congress took action to speed the return of industry to a peace-time operation. A maximum of sixty days was allowed to remove facilities no longer required from the property of the contractor.

A system to screen every piece of

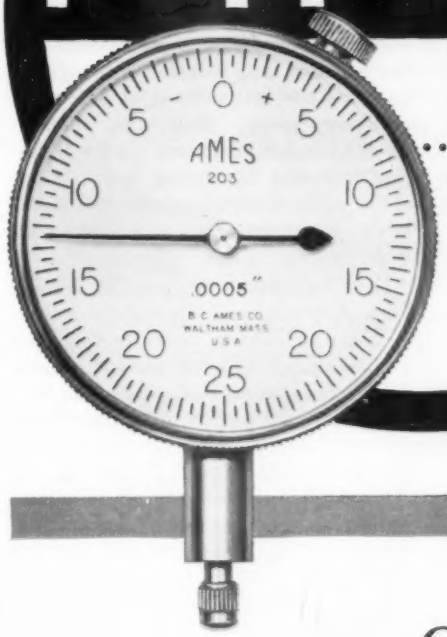
equipment returned to the military was immediately established in order to determine its present or future value for installation in military establishments; also, to be considered as a practical stand-by item to be preserved and placed in central warehouses along with the facilities that were in idle status. These items became known as the Departmental Industrial Reserve.

All machine tools or other facilities not required by the military after all three services had thoroughly screened them for their use were turned over to the War Assets Administration for disposal. Those belonging to DPC were turned over to the WAA without military screening. Many of these items were desirable for a war reserve. When the 80th Congress passed Public Law No. 364, it was possible to transfer accountability of DPA machine tools or WAA equipment to the military without exchange of funds. As soon as this act was made a public law, the war reserve program became a larger program.

Joint Committees of the army, navy and air force representatives were established to develop ways and means to preserve this equipment economically on a mass production basis. Standardization of skids was developed, means of supporting heavy castings to minimize distortion, and permanent set for long-time storage. Dehumidified huts for extended storage were developed and put to practical use. Several complete factories were put into stand-by status. Machines were preserved for twenty years' idle storage and some machines were exercised once every thirty days to keep them properly lubricated and preserved. The cost of preservation and skidding, including a thin coat of gray paint, averaged less than 6 percent of the acquisition cost. This included some badly damaged machines, as previously explained.

At the outbreak of the Korean conflict, the machine tool builders could foresee other emergencies they would be called upon to cope with which would necessitate the industry expanding beyond their ability with regard to economy and manpower. A committee called upon government officials, offering cooperation to formulate a plan to efficiently meet the increased demands. A central control of this inventory was established; cards were prepared to identify equipment and assist defense contractors to select their individual needs. This operation was headed by the Munitions Board. A munitions board chairman authorized and obtained concurrence for the transfer of these facilities to and from the various

AMES



...the preferred Dial Indicators

One of America's largest and most famous mass-producers recently chose Ames as preferred source of supply for indicator gauges.

The reasons behind this decision are the very reasons why *you* should standardize on Ames dial indicators and dial gauges:—the Ames "Hundred Series" indicators available in four sizes, fit every measuring requirement; they are *accurate, sensitive,* low in friction, yet are *rugged* and *tough*—give *more* on-the-job time. All Ames products embody latest design and highest-quality materials; they are manufactured by methods and machines that are *exclusive* with B. C. Ames Co.



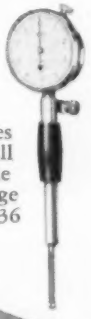
Ames Dial Depth Gauge No. 11C



Ames Dial Micrometer No. 517

Ames Amplifying Dial Comparator No. 26





Ames Small Hole Gauge No. 36



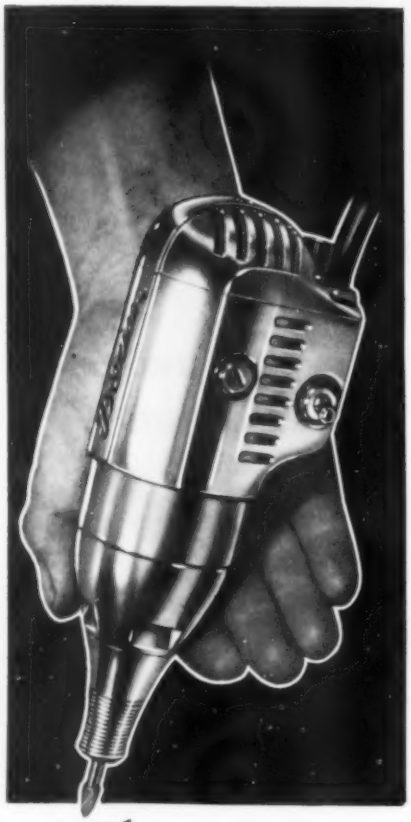
Send today for your free copy of Catalog No. 58

Representatives in principal cities. B. C. AMES CO. *30 Ames Street Waltham 54, Mass.*

Mfgr. of Micrometer Dial Gauges • Micrometer Dial Indicators

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-133

NEW 45,000 R.P.M. AND 1/5 H. P. IN 35 OZ.

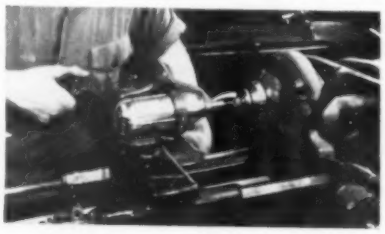


Precise

SUPER 30

OUTWORKS, OUTLASTS ANY TOOL IN ITS FIELD

Twice the power and speed in smaller size and less weight for more uses. Exclusive features include PRECISE Spindle and *draw collet chuck* for precision and quick, easy tool change. Operates *tungsten carbide* Midget Mills as efficiently as conventional rotary tools for grinding, milling, finishing, polishing and other applications on soft and hard materials including the hardest alloy steel. Micro-precision bearings have lubricant sealed in for life; AC/DC motor is air-cooled. Tool measures only 7⅜" long and tapers from 2⅛" at mounting diameter to only ½" D. at chuck nose. Unique PRECISE Mounts are available for set-ups on machine tools.



Write FOR CATALOG

PRECISE PRODUCTS CORPORATION

1314 CLARK ST. • RACINE, WIS.

INDICATE A-10-134-1

Technical Digests . . .

departments to be used by military contractors. This action was considered an emergency means to place these facilities in operation. It was a successful program but the actual need for the facilities was known only, in detail, by the National Production Authority. Therefore, the operation was transferred to NPA control by the Department of Defense, Directive Number 4215.9 dated 30 April 1952.

If it is agreed that an industrial reserve is good for security reasons and the machine tool industry is recognized as being the first arsenal of defense in any emergency, then the industry should receive protection that will prevent suffering by having wartime machine tools dumped on the market in large quantities that will jeopardize their future.

Each military department should carry full responsibility for its reserve in order to control properly technical details unique to each service branch.

It is not practical to store and preserve extremely heavy machinery with the same facilities or operating crew dealing with lightweight types of machine tools used for aircraft manufacturing and maintenance. Large machines can easily be damaged by mishandling and small machines can be damaged by crews qualified and trained on heavy equipment. The cost would be accelerated under these conditions.

Many of the machines in the departmental reserve are tooled especially for production of a single item. If these machines were to be available to any one of the military departments, a grave danger exists that expensive and desirable tooling would be completely lost if the basic machines were drawn from a central inventory for another application.

From an address given at the Machinery Dealer's Assn. Convention June 9, 1953.

▼ ▼ ▼

Forging Developments

C. H. Smith, Jr., Forum Leader

Steel Improvement and Forge Co.

There seems to be a definite trend from hot to cold forgings. Many new and better steels have been produced which have made this development possible. Also, the production of better die steels brought about improvements in this process. Die life is increased considerably in the cold forging process.

Cold forging requires a machine at least five times as large as is needed in



Zagar gearless drillhead, 12", 24-spindle; capacity up to 5/8" steel.

Zagar GEARLESS DRILLHEADS excel for drilling on close centers

Their unique features have earned for Zagar gearless drillheads a permanent place in many industries. Examples: gas burners, acoustical tile, parts for aircraft (jet engines), business machines, electrical appliances, automotive and farm machinery; drilling cast iron, stainless steel, paper, fiber glass, magnesium, aluminum, brass and copper.

Why this versatility? Because Zagar gearless drillheads (1) can drill practically any number of holes at one pass, up to 600 or more; (2) can drill any material; (3) can drill in any pattern; (4) can "come down to" distances between holes as small as twice the drill diameter; (5) can and do maintain accurate spacing. High production thus combines with complete accuracy to deliver more work and more acceptable work in less time than ever before. Zagar gearless drillheads can be furnished as complete units or can be adapted to any standard drill press. Your parts drawings and full data will bring you a prompt quotation.

Write for Engineering Manual "E-10" for more information on Zagar's tools for industry.

ZAGAR TOOL, INC.

24000 LAKELAND BLVD.

CLEVELAND 23, OHIO

Zagar TOOLS For INDUSTRY and SPECIAL MACHINERY

INDICATE A-10-134-2

hot forging. The process is used mostly for cold forging bolts, nuts, etc., rather than for a general line of commercial drop forgings. The statement was made that in some cases the cold operation lent itself better than the hot forging process because it is automatic or semi-automatic.

Initial investment for cold forging machines is considerably more than for hot forging equipment. It was stated that production quantities are considerably increased and working cold is much faster. Therefore, where adaptable, the additional capital investment seems to prove its worth.

Experiments with cold forgings are continuing and limitations at the moment are unknown. Necessary changes in designs or dies may increase the size of stock to be worked cold in the future. There is still much research to be done and it seems a 1-inch size of stock is about the limit today.

Die lubrication is governed by the work to be done. At the moment this does not seem to present a serious problem. It is known that higher carbon steels are less successful in cold forging. Some experimental work is being done on production of jet blades and pinions by the cold forging process.

There has been real progress with designs of tools though little change in the basic hammer designs. The hammers have been designed more rigidly than in the past. Automatic controls have been installed for handling and heating stock so that production has been materially increased. Continued effort is being made to secure greater die life and furnace design has been considerably improved. The pusher type and rotary type furnaces have come into more general use. There is more general use of gas for heating. Suitable installations on various type furnaces of automatic controls have been a trend of considerable advantage to production. Inducting heating likewise is more widely in use than in previous years. Proper heating facilities have had considerable effect on scale reduction though there is still a chance of additional improvement along this line. Rolls for preforming stock have been developed which are believed to save hammer or press operations. Constant redesigning of the forging press points toward saving material, labor and increasing production. A "tong feed" forging machine is in the development stage which will be automatic and probably increase production. The improved applications of forging operations have enabled the industry to produce forgings not previously considered on hammers and presses.

There is considerable opportunity in the immediate future for additional progress in the design and operation of forging furnaces. High-speed gas heat has been extremely helpful in increasing production for special jobs and here the reduction of scale has proved an important question. Induction heating and automatic controls are fast eliminating manual responsibility and assuring more accurate results.

The outlook in forging production is for:

1. Further development of cold forging, particularly as it applies to commercial forgings.
2. Development of automation for hot forging operations.
3. Possibilities for the future of the single blow upsetter.
4. Improvements for automatically handling raw material.
5. Improvements for automatically handling material in process through the plant.
6. New applications to develop the use of forged products now produced by other methods.
7. Study of the movement of plastic materials when being forged.
8. Study of movement of metal at high velocity and determining limits for oppearance of tearing.



▶ FORMING ROLLS

▶ TUBING ROLLS



▶ *To your specification or ARDCOR design —for all makes of roll forming machines*

Made of ARDCORLOY—a special alloy steel.

Maximum production speeds—better products. Any desired profile up to 36 inches in diameter.

Also, manufacturers of Straightening, Pinch and Leveller Rolls to customer's specifications.

American ROLLER DIE CORPORATION

29540 Clayton • Cleveland (Wickliffe), Ohio

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-135

LESS SPACE!

extra high safety factor!



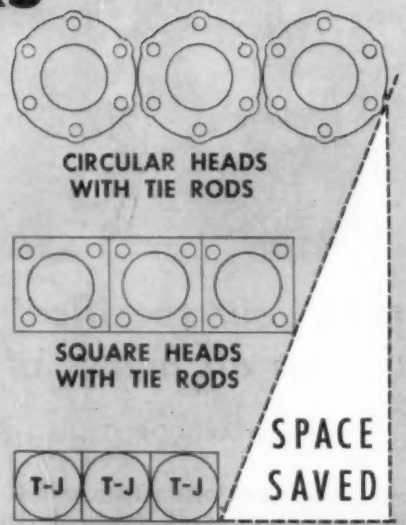
NEW T-J

Spacemaker

AIR CYLINDERS

These new T-J Cylinders *save up to 40% in mounting space*—with streamlined design that eliminates tie rods. They're *super rugged*—extra high safety factor . . . solid steel heads . . . heavy wall, precision honed, hard chrome plated, seamless steel body . . . leakproof cylinder head to body construction . . . heavy duty, hitensile, hard chrome plated piston rod.

Available with the new T-J Super Cushion Flexible Seals which insure positive cushion with automatic valve action for fast return stroke. Many standard sizes and styles . . . for pushing, pulling, lifting, clamping or control jobs. T-J dependability. Write for bulletin 8152 The Tomkins-Johnson Co., Jackson, Mich.



T-J SPACEMAKER . . . provides additional room for adjacent equipment without sacrificing strength.

37 YEARS EXPERIENCE

T-J TOMKINS-JOHNSON

RIVITORS...AIR AND HYDRAULIC CYLINDERS...CUTTERS...CLINCHORS

4 Weeks Delivery on the Spacemaker—any style, any stroke, 1" to 3" diam.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-136

Technical Digests . . .

9. Study of the reaction of material under various types of blows or pressures.

From the 1953 SAE National Production Meeting, Cleveland, Ohio.

▼ ▼ ▼

Stimulating Research and Product Development

by W. F. Rockwell, Jr.

Pres., Rockwell Mfg. Co.
Pittsburgh, Pa.

Top management's responsibility to stimulate research and product development is directly aligned with the executive's responsibility to provide a proper return for the stockholder and the proper product for the customer. If the company expects to remain among the leaders in the pace of modern industry, it is essential to make research an integral member of the corporate team. Research is now a senior member of the firm in the majority of the well-managed industrial organizations.

These are four important areas for the executive to consider in establishing an effective research and development program:

1. Providing the Proper Climate for Research
2. Determining Areas of Desirable Research
3. Employee Participation
4. Incentives for Development of Research Thinking

The glamor in the word research has caused its use to go beyond a reasonable working definition. Kettering has made the statement that "Research is a process of finding out what you are going to do when you can't keep on doing what you are doing now." This is industrial research when accompanied by a definite commercial objective. Unlike engineering projects, industrial research projects—although they have a commercial objective—seldom have a reasonable and clear idea as to how it is to be reached.

In my opinion, basic research—as distinguished from industrial research—can be carried on by only a few of our industrial organizations today.

According to C. C. Furnas in his book, *Research in Industry* an industrial research project should do one or more of the following:

1. Produce new business.
2. Reduce cost of production.
3. Reduce operating cost to the user.
4. Increase utility of the product.
5. Increase its sales appeal.
6. Determine technical information con-

tributory to some other project.

To assure a good batting average for the laboratory and to maintain a high degree of enthusiasm at all times, the research program should include a sufficient number of projects reasonably certain of solution.

If the research executive is seasoned and experienced he will diversify his planning to include the proper balance of projects. Short-term projects, in general, are a reasonably sure investment, but with a low return. Medium-term projects, which may require three years, have a fairly sure return, but with a higher yield. Long-term projects of five years or more, are not so sure but in some cases with proper selection may yield a return of 10:1. The objective should be to spread the investment in research projects to provide the best average return.

Properly encouraged active membership in technical societies and trade associations is definitely an incentive for the development of research thinking. Industry has the use of many such agencies of which the wise research director makes full use. Technical societies and trade associations set up standards and disseminate information on latest developments in their particular fields. At times they assist in, or actually perform, research. These functions supply small business with much information which would not otherwise be available to them

The contributions of technological advancement by industrial research in the past twenty years clearly shows its profit-making potential. Certain advancements will always come about without the necessity of a formal program; however, accomplishment through a planned program is more efficient and more prolific than through an informal one. This is easy to say and do in prosperous times when the industrial trend is on the rise. The forward looking executive will, however, firmly establish his industrial research program to continue even when business dips.

From a paper presented at the 1953 ASME Management Conference, Detroit, Mich.

▼ ▼ ▼

Aircraft Machine Tools

A. Kastelowitz, Panel Leader
Republic Aviation Corp.,
Farmingdale, L. I.

For the past fifty years the machine tool manufacturing industry has evolved



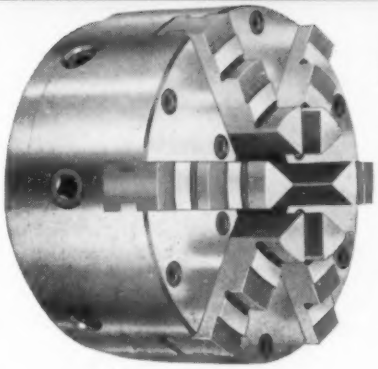
"All I said was our costs had gone down now that we are using Columbia EXTRA tool steel."

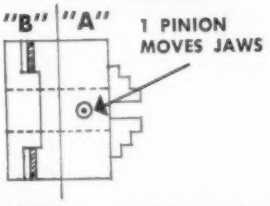
COLUMBIA TOOL STEEL COMPANY • CHICAGO HEIGHTS, ILL.

Producers of fine tool steels—High Speed Steels
Die Steels—Hot Work and Shock Resisting Steels
Carbon Tool Steels.

TOOL COLUMBIA STEELS

The UNIVERSAL Chuck with .0005 PRECISION!





HOW and WHY it Works

Chuck gripping section "A" is like any scroll chuck with one pinion to make jaws. (accurate to .003"). Section "B" shows how chuck "floats" on adapter (.020" clearance) where 4 opposed screws move chuck on adapter for adjustment to dead true precision. Jaws always come back within .0005" on duplicate work.

Buck AJUST-TRU CHUCKS

6 JAW 6" CHUCK HANDLES WORK OF 93 COLLETS!

The capacity of $1,000 worth of collets for your tool room PLUS scroll chuck rechucking speed on duplicate parts with .0005" precision . . .

The firm grip of 6 jaws for soft metal or tube work . . .

An end to most needs for stub arbors, mandrels, or special fixtures . . .

A reliable precision chuck adaptable to lathes, screw machines, grinders, dividing heads . . .

The greatest development of recent years to save machinists' time . . .

That's the brief story of this sensational Ajust-Tru chuck. It is unbelievable — but true! Send for catalog with full details.

SIZES AVAILABLE

3- and 6-Jaw Chuck—4" (light duty); 5", 6", 7½" (heavy duty)
2-Jaw Aviation Chuck—6", 7½" (heavy duty)

BUCK TOOL CO.

1033 Schippers Lane • Kalamazoo, Mich.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-137

WHAT'S IN IT...





FOR YOU?

Our view of Kennametal discloses a sound, uniform physical structure that gives promise of consistently good mechanical properties. These are static until put to use on the job—translated into machining advantages for you.

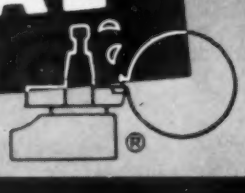
We put more of the best into Kennametal so you may get more of the best out of it.

What is in it for you? Uniform hardness, unusually high strength, great durability. What do you get out of it? Consistent tool performance, long life. These are reflected in time savings on the job, better use of machines, less grinding expense, lower production costs.

Can we prove it? Yes— there are scores of outstanding Performance Reports on a wide variety of Kennametal applications. These are yours for the asking, or we shall be glad to demonstrate by cooperating on any tooling problem in your plant. Our Field Engineers will be glad to help you. Kennametal Inc., Latrobe, Pa.

KENNAMETAL

CEMENTED CARBIDE TOOLING
THAT INCREASES PRODUCTIVITY



Technical Digests . . .

around the needs of the automotive and allied industries. Aircraft manufacturers were concerned chiefly with sheet metal requiring little or no machinery, and power plants produced on same patterns as those of the automotive industry. Present aircraft designs have changed this picture extensively. Now the sheet metal has become plate, and fabricated assemblies have become forgings, both of which must be machined. Thus a requirement has been created for an entirely new field of machine tools. This condition must be met immediately, whereas the evolution of the present machine tools was over a fifty-year period, and was at a rate which could be privately financed and carried out with a guaranteed market for the tools designed and built.

With aircraft designs changing so rapidly no such guarantee can be provided. The design of the necessary new tools becomes a highly speculative program for the tool builders. In order to alleviate this situation it was felt by most that the only answer lies in the Government's providing sums for such development. In the past USAF has paid largely for the tooling of an airplane. Now this tooling must apparently include special machine tools.

The question of imported vs. U.S. tools brought up several points of interest. Canadian tools should not be considered in the same category as European since they are built according to U. S. Standards.

Much of the dissatisfaction with foreign tools results from two chief causes:

1. Under powering due to different motor standards.
2. Tool frames less rigid than those of U. S. probably due to lighter loads being expected than those encountered in U. S. Production.
3. Foreign tools have been used in this country largely for one reason—availability. In only one instance, that of a certain gear hobbing machine, the foreign market was the only source.

With reference to the past work on increasing machinery speeds, it was strongly stressed that the machining time presently consumed in the manufacture of a part is the smallest single item and that, therefore, emphasis should be placed on development of better handling and jigging equipment.

From a panel discussion of the SAE Production Forum held during the 1953 SAE Nat'l Aeronautic Meeting.

▼ ▼ ▼

WHELAND COMPANY solves warpage problem,

Foundry Developments

E. C. Jeter, Forum Leader
Ford Motor Co.

The foundry industry has progressed rapidly in the last ten years.

There is a definite tendency in the malleable foundry industry to perform secondary operations such as coining. The function of coining to eliminate machining by the customer is one of the better selling points for the malleable foundry industry, and it is a job that can be done if proper equipment is available. Coining provides a casting which the customer can put into operation with little machining. By casting surfaces without finishes, there are definite locating points with which to check castings for proper machining.

The outlook for steel castings utilizing the shell-molding process is questionable. The shell-molding process does not look good for carbon steels. At present, it is just not practical because we get a souring effect. So far there is no company making straight carbon steel castings commercially but experimentation is definitely under way. In this case the pattern equipment is expensive for the shell-molding process. A high-production foundry might conceivably use it. Insofar as the steel-casting business is concerned, the emphasis today is working with present molding materials.

In addition to emphasizing the use of the present molding materials, there is a definite trend in the steel-casting foundry to make castings smaller and less complex than formerly. For example, in the last five years at least six open-hearth foundries have put in weld-fabricating shops. By so doing they are able to work with the customer to break up the one-piece casting design. They then put the pieces back together by welding. It is no longer an industry characterized by craftsmen. The approach today is more from the engineering standpoint. Steel castings are as readily weldable as plate and in some respects more so. This practice has been probably the greatest single change in the foundry industry within the past five years.

Experiments to test the value of a vacuum process in pouring castings has indicated that it reduces internal pressure.

The problem of testing castings in the different types of foundries revolves around the use of destructive and/or nondestructive media. In the aluminum foundry it is general practice to use nondestructive tests. The first group of castings is automatically X-rayed. It is generally believed that taking machine cuts is quite advisable. The machine cuts are oftentimes off and a comparison made with the X-ray. Destructive testing methods in the aluminum foundry are generally confined to scrap castings. However, an important factor in the determination of methods is the nature of the work performed. For example, in a non-captive shop, dealing with the general customer, the foundry may make 10 or 10,000 castings on order. Some are highly alloyed metal jobs, others not. Some are complicated core work jobs, others not. When high alloys or complicated cores are involved, or large orders, destructive testing would be resorted to to assure success in the ultimate run. One gray iron foundry X-rayed cylinder heads and found it to be of great advantage to use X-rays. Magnetic testing has been used extensively in the steel-casting industry. However, it is not used on every sample testing. Interpreting X-ray is difficult for a commercial job, although it is probably used more in the steel-casting industry than in most foundries. A correlation between the result of the X-ray films and the actual service should be developed. Case Institute is working on such correlation currently.

The malleable foundry industry does

JOIN INDUSTRIAL AMERICA—
Heat Treat High Speed Steel
The SENTRY Way!
"ALWAYS ON DUTY"



Sentry Delivers Precision Heat Treating at HAMILTON WATCH

The Sentry installation at Hamilton Watch Company's Lancaster, Pennsylvania, plant makes possible precision heat treating of high speed steel . . . including mills, miniature form cutters, reamers, and drills as small as .0065". Some high alloy tools and watch parts, requiring high temperature heat treating, are hardened in Hamilton's Sentry furnace.

Hamilton's research technicians make frequent use of the Sentry furnace to test new production tools made from various experimental high speed alloys.



Sentry 5Y installation at Hamilton Watch Co., Lancaster, Pennsylvania



Request Catalog H-4

THE SENTRY COMPANY
FOXBORO, MASSACHUSETTS

INDUSTRIAL ELECTRIC FURNACES AND EQUIPMENT FOR HEAT TREATMENT OF METALS

VISIT US AT BOOTH 1103 METAL SHOW--CLEVELAND, OHIO--WEEK OF OCTOBER 19TH
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-139

WHELAND COMPANY solves warpage problem, saves time, labor and materials with

FARQUHAR Hydraulic Presses



This straightening operation utilizes a 50-ton Gap-Type Farquhar Press on an 8-hour-day production basis.



500-ton Farquhar Hydraulic Press straightens 16′ forged tubes at The Wheland Co., Chattanooga, Tenn.

THE Wheland Company, Chattanooga, Tennessee, uses Farquhar hydraulic presses to help speed production of vital defense products. For example, a 500-ton Farquhar Press is used for straightening forged tube approximately 16′ long, varying in outside diameter from 6″ to 10″, with an inside bore of 2″ diameter. This operation alone has solved one salvage problem, since less scrap results as stock distribution is equalized by straightening.

Scrap and salvage due to warpage have been eliminated in another operation, where a 50-ton Gap-Type Farquhar Press is used to straighten ⅞″ bars, 3″ wide, 65″ long. Together, the two presses have speeded production. Neither press has required any maintenance other than regular services since installation!

Farquhar Presses Cut Your Costs

Just one more example of cost-cutting Farquhar performance in modern production! Farquhar Presses are built for the job . . . assure faster production due to rapid advance and return of the ram . . . greater accuracy because of the extra guides on the moving platen . . . easy, smooth operation with finger-tip controls . . . longer life due to positive control of speed and pressure on the die . . . long, dependable service with minimum maintenance cost!

Farquhar engineers are ready to help solve your production problems. Your request will bring them running . . . at no obligation, of course.

For free catalog, write to THE OLIVER CORPORATION, A. B. Farquhar Division, *Hydraulic Press Dept.*, 1519 Duke St., York, Pa.

Farquhar
HYDRAULIC PRESSES
for Bending • Forming • Forcing • Straightening • Assembling • Drawing
Extruding • Jogging • Forging • and other Metalworking Operations

THE OLIVER CORPORATION • A. B. FARQUHAR DIVISION
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-140

Technical Digests . . .

not use the X-ray extensively. After a malleable casting is made, a heat treatment is necessary. To determine that the castings are internally correct, when starting a new job, destructive testing is normally utilized. Magnaflux is used to a certain extent.

Engineering groups should work closely with foundry groups. However, at the present time, there is little or no correlation between the two. Realistic judgment and work are needed to make costs because one cannot find out what a commercial casting is. To approach this problem, the foundryman must know the metal specifications, finish, design, and the purpose of the casting. Such information would help.

From a paper presented at the 1953 SAE *Production Forum*, Cleveland, Ohio.

▼ ▼ ▼

EVALUATING CUTTING FLUIDS *by W. E. Lauterbach, Chief Engineer, The Albright Co., and E. A. Ratzel, Head Mechanical Engineering Section, Midwest Research Institute.*

An experimental method of evaluating cutting fluids was investigated extensively. The method consists of gradually changing the rake angle of a cutting tool in a two-dimensional cutting process and observing the change in chip formation and surface of the workpiece. The angle at which the chip changes from discontinuous to continuous is termed the "critical rake angle" and is taken as a characteristic of the cutting fluid. The method shows reproducible sensitivity to changes in fluids and other cutting conditions. An evaluation of several samples corresponds favorably with an empirical field rating of fluids.

It was found that (1) the depth of cold work and (2) the magnitude and direction of the resultant tool force are approximately constant for the cutting fluids at their respective critical rake angles. This substantiates a hypothesis that at the critical rake angle, some important characteristics assume definite numerical values, since they are a consequence of the mechanical behavior of the work material during the process of chip formation. Thus, the critical rake angle has a definite correlation with the field performance, since the only variables present in the laboratory evaluation are the fluid and the rake angle.

From a paper presented at American Society of Lubrication Engineers' 1953 annual meeting.

of 3.1 is used. This conversion is based on the finding that most surface profiles lie between a sine curve and a triangu-

on this subject in *Werkstatt und Betrieb* of July 1953. He indicates that the absence of stresses usually generated by a

sharpening of these tools is simple be-
cause only one face of the tooth need
to be ground thereby preserving

Abstracts Of Foreign Technical Literature

By M. Kronenberg

Surface Improvement by Burnishing

A surface roughness of 0.0012 inch left by a turning operation on a cylindrical workpiece can be reduced in one operation to a surface finish of 0.000004 inch according to a paper by H. Koenig published in *Werkstatts Technik und Maschinenbau*, June 1953. He has run a number of investigations applying high pressures to burnishing rolls, proving that the feed marks of a turning operation (that is the peaks of the surface) are not folded over as often assumed, but rather compressed into the work material while the valleys are simultaneously lifted. The pressure must not exceed a limit value to prevent distortion of the surface layer and flaking of surface metal.

When using proper tools and machinery, however, it is possible to produce very accurate surfaces free of irregularities and waves. The advantages of the burnishing process lie in the high accuracy, the low cost and savings in time. In addition, the surface is compressed and hardened while being burnished. Run-in time for shafts and similar rotating elements is anticipated by the burnishing process. The author, who is associated with the German railroad system, ran his tests to obtain a high surface finish on railroad axles, but has also carried out tests on piston rods, rolls, and similar cylindrical workpieces. The burnishing pressure was correlated with the unit length of the roll rather than to an area because of the complications involved in measuring the projection of a cylindrical area. This pressure was varied between about 5500 lb per inch to about 16,500 lb per inch of roll width, with the result that the work diameter was reduced by 0.0004 inch to 0.0008 inch due to the burnishing of the surface.

The author discusses in detail factors influencing the process such as the number of passes, roughness of the turned workpiece crosswise and lengthwise, effect of the burnishing feed, speed, lubricants, and geometrical shape of the tools. He indicates also that a similar process applied to guideways of machine tools has been developed by Iwascheff.

Instruments for Measuring Surface Finish

A survey of instruments for measuring surface finish developed by Leitz in Germany is given in a paper by R. Schulze in *Werkstattstechnik und Maschinenbau* of June 1953. The two basic types of instruments are respectively for laboratory use and for use in the machine shop. In the laboratory instrument, the Forster-Leitz apparatus, roughness is magnified in a ratio of 1000:1, while the tracer point is lifted electro-magnetically at the rate of 50 or 100 strokes per second. This motion is converted into a light beam producing a trace on photographic paper.

On the other hand, in the workshop instrument the actual surface profile is not reproduced on paper as in the first instrument but only the root mean square of the surface. This is obtained by a tracer which follows the contour of the surface and generates an electric impulse which is always proportional to the tracer speed. It can be shown mathematically that such current can be converted into the rms data.

Unfortunately surface roughness is defined differently in USA, England and Germany. While the rms is used in USA, the algebraic mean is used in England and the total difference from peak to bottom in Germany. In comparing surface finish data it is necessary to take this into consideration as US values appear considerably finer than English and German data.

The author indicates that to convert the rms obtained with the instruments into German roughness values a factor

SHELDON
CHICAGO U. S. A.



More will be *profit* with a SHELDON

It actually costs less to do most turning jobs on a Sheldon Precision Lathe. Machine-tool investment is cut to a fraction. Power cost is materially reduced. Less experienced operators can operate Sheldons safely and efficiently. Even cost-loadings for plant—floor space, heat and light are lower because two Sheldons can often operate in the space occupied by one large lathe.

On most "everyday" jobs a Sheldon will actually turn out more pieces per hour too. With double V-belts to the spindle Sheldon lathes deliver enough power to take a healthy bite in direct drive, at really high speeds. Sheldon's "Zero Precision" Taper Roller Bearings permit work to the closest tolerances. Very seldom if ever are such extremely accurate bearings used in other lathes.

You will actually keep more as profit if you use Sheldon Lathes wherever possible.

Write for Catalog



SHELDON MACHINE CO., Inc. 4229 North Knox Ave., Chicago 41, Illinois

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-141

Technical Shorts

plier of the metal prior to the seizure

of 3.1 is used. This conversion is based on the finding that most surface profiles lie between a sine curve and a triangular surface contour.

Shaving Barstock

Barstock can either be drawn to close tolerances or turned in a shaving operation by rotating tools. The latter process has come to the fore in recent years following the development of sintered carbide tools and since investigations have been carried out to determine cutting forces and the tool life—cutting speed relationships. H. Mackelt reports on this subject in *Werkstatt und Betrieb* of July 1953. He indicates that the absence of stresses usually generated by a drawing process is one of the advantages of the shaving process because such stresses are not set up in a shaving operation. If desired, the turning operation can be supplemented by burnishing.

The turning cutter due to its special shape, permits high feed rates and prevents vibrations, thus producing a smooth surface. Inserted tangent cutters are described as a progress in design that lends itself to the physical properties of the carbide materials. Resharpening of these tools is simple because only one face of the tooth needs to be ground thereby preserving the desired contour. The modern shaving lathe with infinitely variable speed control incorporates a shaft feeding mechanism and a discharge mechanism. Remote control is possible with cutting speeds ranging from 15 to 150 ft per minute which cover all speeds required for shaving operations. The article contains diagrams which permit the determination of the various quantities for an economical approach such as a diameter, chip cross sectional area, specific cutting force, production figures, cutting speeds and surface finish. His diagrams indicate that a shaved surface has a (German) roughness of 0.001 inch which can be reduced to 0.0001 inch by a subsequent burnishing operation.

Tool Life of Dies

Some twelve factors affect the life of dies according to an article by F. Strasser in *Werkstatt und Betrieb* of July 1953, making it difficult to determine the useful number of pieces that can be produced before reconditioning is required. Solid blocks are superior to sectional dies with regard to wear and compound dies to piercing dies.

Type, hardness and thickness of material to be cut has a great effect on the life of the die, followed by other factors such as size and shape of the cut, die design, particularly the cutting angles, clearances, quality of the material, presses employed and lubrication.

Carbides are more and more frequently employed for cutting components of the dies. Good alignment and uniform clearance are required to avoid non uniform pressure distribution.

The end of the life of a die is usually indicated by the appearance of burrs on the workpiece. It is recommended the die be reconditioned when the burr exceeds about 0.001 inch; burrs of smaller size can be easily removed by tumbling.

The author considers a production of about 100,000 pieces without regrinding of the die as satisfactory tool life when cutting with alloyed steel of 60 Rockwell C, using a cutting angle of 89½ degrees and piercing material of 0.80-inch thickness and a tensile strength of 50,000 psi. If the same die were used for cutting material of 65,000 psi, the tool life would drop to 70,000 pieces. Assuming light burrs are admissible, the life of the first tool could be increased to 150,000 pieces and that of the second to 100,000 pieces.

Other information given in this article covers the amount of metal which may be removed for resharpening of the dies at reasonable cost, and factors which govern the design of the presses and their alignments.



Ask for a free demonstration

or technical bulletin No. T-1053

HYPREZ DIVISION
ENGIS EQUIPMENT COMPANY, CHICAGO 5, ILL.
431 SOUTH DEARBORN ST.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-142



reputed to be the world's largest submarine fleet, makes it urgent that

Technical Shorts . . .

TECHNICAL DATA sheets on Cuprovac-E and Ferrovac-52100 have been made available by Vacuum Metals Corp., subsidiary of National Research Corp., sole commercial source of vacuum melted metals and alloys in this country. According to company researchers, the distinctive properties of these gas-free high purity metals are important in many industrial applications.

Cuprovac-E possesses properties suited for vacuum tube manufacture, while Ferrovac-52100 is free of inclusions and has improved fatigue properties.

* * *

MINING OF strategic tungsten and development of new domestic sources of supply will be stepped up as a result of the signing of Public Law 206 recently by President Eisenhower.

Additional importance of these steps lies in the possibility that should Indo-China fall under communist domination, tin and tungsten obtained from that area would be lost to the free Western World. Now, long-range planning designed to make the United States self-sufficient in tungsten in the event of a national crisis is encouraged by the recently formed Tungsten Institute, with offices at 1757 K Street, N.W. in Washington.

At the moment, the United States is producing about 20 percent of the Free World's output of tungsten which is vital to the manufacture of high-speed cutting steels as well as to the production of jet engines for aircraft.

Acknowledging the importance of expanding the domestic tungsten mining industry, Congress passed Law 206 which says, in part, "It is hereby recognized that the continued dependence on overseas sources of supply for strategic or critical minerals and metals during periods of threatening world conflict, or of political instability within those nations controlling the sources of supply of such materials, gravely endangers the present and future economy and security of the United States.

"It is, therefore, declared to be the policy of the Congress that each department and agency of the Federal Government charged with responsibilities concerning the discovery, development, production and acquisition of strategic or critical minerals and metals shall undertake to decrease further and to eliminate where possible, the dependency of the United States on overseas sources of supply of each such material."

Guided by this line of thinking, the Tungsten Institute is stimulating development of known large and important deposits of tungsten ore in this country and the exploration of undeveloped prospects. Known principal domestic sources are now located in California, Idaho, Nevada and North Carolina.

China was the world's largest supplier of the metal prior to the seizure of that country by communists; now that supply goes to Russia.

Now the West's main sources of the ore, other than our own country, are South Korea, Portugal, Spain, Bolivia, Brazil, Burma, and Canada, Australia and British Malaya of the British Commonwealth. However, supply lines to any of these countries except Canada would be difficult to keep open in the event of war.

As pointed out by W. Lunsford Long, president of The Tungsten Institute, Russia's recent claim to possession of the hydrogen bomb, along with what is

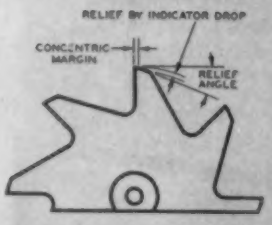


FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-143

production depends.

MORE SMOOTH ACCURATE HOLES at LOWER COST with

Blue-Helix Reamers



CORRECT DESIGN

Right hand spiral cut with positive rake at the cutting edges—a design pioneered by P&W—assures fast, free cutting with ample chip clearance.



Here's Why

DISTINCTIVE P&W SPECIAL SURFACE TREATMENT

Special additional P&W surface-hardening process gives longer wear life with superior resistance to chip abrasion.

SMOOTHER GRINDING

Provides maximum resistance to wear.

SUPERIOR ACCURACY

Cutting Diameter, Shank Diameter and Chamfer closely controlled to meet rigidly high P&W standards for size and concentricity.

AVAILABLE

. . . from stock in standard diameters with straight or taper shanks. Also available, special diameters from .0310" to 1.537" with straight shanks, and from .222" to 1.537" with taper shanks, promptly finished to order from hardened in-stock blanks.

YOU CAN

put a P&W Blue-Helix Reamer on any job in your shop—from abrasive high-silicon aluminums to high-tensile heat-treated alloy steels—with full assurance that it'll do the job right . . . at lower cost!

FOR COMPLETE INFORMATION

. . . use the coupon below to send for your copy of Circular No. 563 today.

First Choice for Accuracy



PRATT & WHITNEY
DIVISION NILES-BEMENT-POND COMPANY
16 Charter Oak Blvd., West Hartford 1, Conn.

Please send my free copy of Circular No. 563

NAME_____
POSITION_____
COMPANY_____
CO. ADDRESS_____
CITY_____ ZONE___ STATE_____

reputed to be the world's largest submarine fleet, makes it urgent that domestic expansion of the strategic metal-mining industry be pushed as rapidly as possible.

Recognition of the importance of developing new domestic sources of supply is not completely new. In 1950, the Government adopted a five-year price program under which it agreed to buy three million units (20 pounds of tungsten trioxide comprises a unit) of domestic origin tungsten. The new law extends the Government purchase program to 1958, in order to encourage expansion of the mining industry. To June 26, 1953, only 283,495 units had been delivered to the Government.

* * *

SEVERAL organizations and companies are offering films as a service to the industry and also to better acquaint the public with their operations.

Among these is the series released by South Bend Lathe Works, who is supplying, on a loan basis, three 16-mm sound movies to help in training lathe operators. "Metalworking Lathe" introduces the lathe to the beginner presenting lathe parts and operations. The second, "Plain Turning", shows all operations necessary to machine a shaft; film three, "Grinding Cutter Bits", shows the correct way to grind tools for different lathe operations, and helps to impress on trainees, from the beginning, facts about proper machine handling and care in addition to instructing them in operator safety.

Each film takes approximately 20 minutes to show and each has sound tracks available in French and Spanish as well as English.

Details on availability of these films may be obtained from the company, 425 E. Madison St., South Bend 22. Bulletin 5230 also discusses them further.

This fall the National Tool and Die Manufacturers Association has introduced a 20-minute sound movie entitled, "Tool and Die Making—Keystone of Mass-Producing", which has been in the making during the past year. It explains the significance of the industry by showing how modern conveniences have been brought to the public because of today's tools and machinery which have brought low-cost mass production of interchangeable parts. It demonstrates the craftsmanship required in the industry, follows progress of an apprentice through the 8,000-hour course leading to journeyman status.

In addition, the film shows production procedures on a diversified list of items, and the toolmaking practices

SMALL DEFENSE Plants Administration has issued a new booklet designed to

and effort can be reduced in many machine operations.

A PRECISION investment casting labo
ratory for experimental work

upon which sub[illegible] production depends. Prints of the film are available for loan or purchase from the association's offices, 907 Public Square Bldg., Cleveland.

"Forging in Closed Dies", a 33-minute film, serves as an introduction to the closed die forging process, tracing the history and background of the industry, as well as giving a picture of the work as it is carried on today in many different companies, and finally, shows the entire process from steel-yard, through making of dies, to the finished drop forge. It gives a comprehensive picture of the operation of steam and air lift hammers, board hammers, and mechanical and hydraulic forging presses, and a typical die room is shown in operation, pictured, as a complete story about cutting and preparation of the die is explained. Heat treating and cleaning operations are also described. In addition, the film shows examples of familiar forgings, presenting both completed pieces and others in process.

General Electric Co. has announced the availability to business and industrial concerns of the movie "A Is for Atom", as a summary of present knowledge of the application of atomic energy. The film, which has been reviewed and endorsed by the Atomic Enery Commission, goes into detail on atomic energy explaining the phenomenon of nuclear fission, and outlining potential benefits in industry, agriculture and other fields.

Two other films are aimed at acquainting industry with special advantages obtained through use of company products.

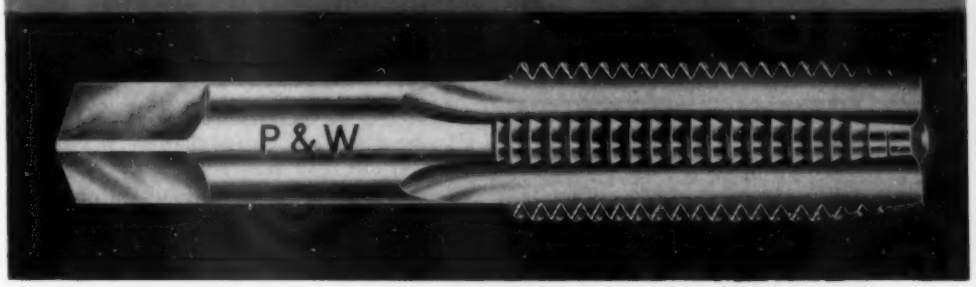
"Hold Everything", a 20-minute 16 mm sound film, has been released by the Allen Manufacturing Co. It is based on three major themes: describing the reason why industrial distributors carry the Allen line; pointing up the important differences between socket screws and other types of fasteners; and illustrating advantages contained in the company's particular line of socket screws.

Further information may be obtained from the company's Sales Dept., Hartford 2, Conn.

Another film has been made available to those interested in factory production-line painting operations. "Miracles in Painting" describes the Ransburg No. 2 process of electrostatic painting, and shows production line applications. A case-history style of presentation displays clearly the advantages of the process.

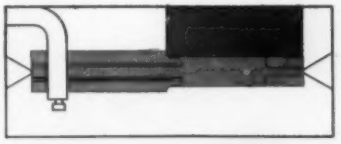
The 16-mm color sound movie is available from Ransburg Electro-Coating Corp., Barth and Sanders Ave., Indianapolis 7.

P&W TAPS
Always Concentric
Always Accurate



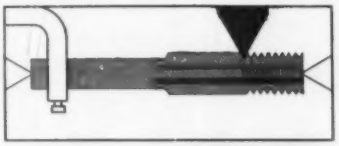
because.. All Important Operations on Pratt & Whitney Ground Thread Taps ARE PERFORMED ON CENTERS!

SHANKS GROUND on CENTERS



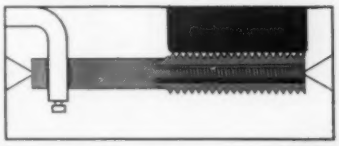
Shanks are precision ground, on centers, as the first step in insuring concentricity between the chuck and the threads on the tap itself.

THREADS GROUND on CENTERS



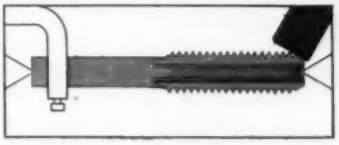
Threads are precision ground, on centers, to insure a uniformly perfect thread form, the basis of clean, accurate threads in the finished work.

O.D.'S GROUND on CENTERS



Outside diameters are precision ground, on centers, another step in maintaining necessary concentricity between shank, pitch diameter and crests of the thread.

CHAMFERS GROUND on CENTERS



Chamfers are ground, on centers, thereby guaranteeing equal distribution of the chip load per tooth, on each land of the tap, as well as close control of tapped hole size.

YOU GET MORE for Your Money from P&W Taps

For complete information on Pratt & Whitney Taps, write on your Company letterhead to the Branch Office nearest you — or direct to West Hartford.

PRATT & WHITNEY
DIVISION NILES-BEMENT-POND COMPANY
WEST HARTFORD 1, CONNECTICUT, U. S. A.

First Choice for Accuracy

BRANCH OFFICES AND STOCK . . . BIRMINGHAM* • BOSTON • CHICAGO
CINCINNATI • CLEVELAND • DALLAS (The Stanco Co.) • DETROIT • LOS ANGELES
HOUSTON (The Stanco Co.) • NEW YORK • PHILADELPHIA • PITTSBURGH
ROCHESTER • SAN FRANCISCO • ST. LOUIS • EXPORT DEPT., WEST HARTFORD

MACHINE TOOLS • CUTTING TOOLS • GAGES

Field Notes . . .

CITY_____ZONE___STATE_____

SMALL DEFENSE Plants Administration has issued a new booklet designed to help small business firms increase efficiency by improving their system of materials handling.

It covers movement of raw materials, parts-in-process, and finished products, and includes both manual and mechanized operations.

In addition it outlines a method for determining whether a plant's materials-handling system is as good as it should be; explains various types of equipment that may be used to increase efficiency; gives practical pointers on good plant layout, and explains how waste motion and effort can be reduced in many machine operations.

The booklet points out that because materials handling is a continuous process, it is often overlooked as an important element in the cost of operation, and as a factor in both production and sales. Yet in some plants materials handling accounts for as much as half of the manufacturing cost, and poor materials handling is expensive.

The 42-page booklet, Improving Materials Handling in Small Plants is on sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. **20¢**



THE MOST UP-TO-DATE AND COMPLETE CARBIDE TOOL CATALOG AVAILABLE

- A completely new carbide tool catalog, shadow indexed for ready reference.
- 92 pages contain complete listings on Super Standard Carbide Tools, sizes and engineering information.
- Many new carbide tools cataloged for the first time, including an extended line of solid carbides.

Send for your copy today

SUPER TOOL CO.
21650 Hoover Road, Detroit 13, Mich.
Please send me my copy of Super catalog No. 54.
Name _____ Title _____
Company _____
Address _____
City _____ Zone _____ State _____

Super TOOL COMPANY

21650 Hoover Rd., Detroit 13, Michigan • 5210 San Fernando Rd., Los Angeles 3, California

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-146

A PRECISION investment casting laboratory for experimental work on complex ordnance parts has been installed at the Naval Ordnance Test Station at China Lake, Calif. The process, which has been used for creative work since prehistoric times, came into a major industrial usage during World War II for the making of precise turbo-supercharger "buckets" from a very difficult-to-machine super-alloy. Advantages of the process are possible tolerances as small as 0.003 inch per inch and the absence of a centerline on finish castings.

The new laboratory, according to the Navy's Office of Information, will aid information to open literature, investigate additional uses for the process and work toward possible improvements.

* * *

SAFE HANDLING of strong sources of Cobalt 60 is possible with a portable directional exposure shield recently designed by Technical Operations, Inc. Cobalt 60 is finding more and more possibilities in the industrial radiography field, but still presents hazards in handling. The shield, known as the DES, can be used for thick or thin sections from 6 inches or more down to a mere fraction of an inch of steel, brass, bronze, or other metal, and shields all radiation from a gamma source except a beam, which may be directed only at the area to be exposed. During exposure, the radiographer is completely safe in the immediate area, as long as he is outside the actual beam. The Cobalt 60 is moved into or out of position simply by rotating a handle through 180 degrees. Only one control is to be moved for exposure. Exposure calculations are simple. The source may be raised 56 inches or lowered to 12 inches from the floor. The beam may be varied from straight up to 45 degrees below the horizontal.

* * *

RESULTS OF study have shown that barium titanate offers possibilities as a ceramic substitute for crystals ordinarily used in sound pick-up devices. In some cases the ceramic presents somewhat improved properties over crystals. According to the Navy Technical News, a complete, commercially practical dry-pressing process for the manufacture of barium titanate units with improved physical and electrical properties has been developed under Naval Research.

Production of ceramic units suitable for sonar use is fairly certain should a good, reasonably consistent raw material be developed.

Details on the subject are obtainable from the Navy Technical News Office of Information, Navy Department

branch. Philip H. Threshie, who has been a field engineer on the West Coast,

Pennsylvania Salt Manufacturing Co.'s new $8,000,000 electrolytic chlo-

nomical bright nickel-plating method. It is said that this process can be

ROCHESTER • SAN FRANCISCO • ST. LOUIS • EXPORT DEPT., WEST HARTFORD
MACHINE TOOLS • CUTTING TOOLS • GAGES

Field Notes . . .

The recently completed plant addition to Tubular Micrometer Co. in St. James, Minn., is now in production. Achievement of full production in this additional space is expected to give the company not only a substantial increase in output volume of present lines, but will provide opportunity to initiate production of a number of new precision instruments of an allied nature according to Howard James, president of Tubular Micrometer.

•

Making shop layouts may be somewhat simplified through the use of scale models of machine tools now offered on a free loan basis by South Bend Lathe Works. Several models each of nine different machine tools as well as models of mechanics and floor plan layout sheets cross-ruled to the same scale as the models, are included in a standard kit. To use the models effectively, it is necessary to simply sketch the shop room floor plan to scale on the layout



sheet, indicate doors, windows, columns and stationary and fixed facilities, then move the models about until a satisfactory arrangement is achieved.

Among the principal advantage in using the models to work out a shop plan is the speed and ease with which they can be arranged and rearranged; elimination of hours of drafting; opportunity to study in advance lighting, work space, traffic lanes, etc., thus avoiding errors not easily seen on a draftsman's two-dimension layout; and the lowered cost involved in moving these models about as compared to shifting machines after installation.

Models are made to a scale of ¾ inch to 1 foot.

Information is available from the company at South Bend, Ind. Bulletin 5301 describes the kit in detail.

The Baker-Raulang Co. celebrates its 100th anniversary this year. The firm had its birth in 1853 when Jacob Rauch operated a wagon repair and blacksmith shop catering to stagecoaches. Twenty-five years later he took in a partner, and the Rauch & Lang Carriage Co. was formed. Only shortly before the turn of the century, Walter C. Baker, working with Thomas Edison, developed one of the first electric automoblies. In 1915 his company, The Baker Motor Vehicle Co., merged with The Rauch & Lang Carriage Co. to form The Baker-Raulang Co., a merger designed to take advantage of the two companies' facilities jointly for the production of the Owen Magnetic automobile. Within a year, however that industry was shelved in favor of war production. Since 1917, the firm has concentrated exclusively on powered handling equipment.

•

Acquisition of the carbide form tool grinding equipment and personnel of Corlett-Turner Co. has been announced by Spiral Step Tool Co. and marks that company's entry into the carbide form tool field on a broad production scale. Prior to this time, Spiral has been primarily engaged in the cutting tool business. With the transfer of the Corlett-Turner equipment and grinding method for grinding carbide, to Spiral, that firm has expanded its facilities to the point where they can meet all demands for screw machine cutting tools, company announcement said.

•

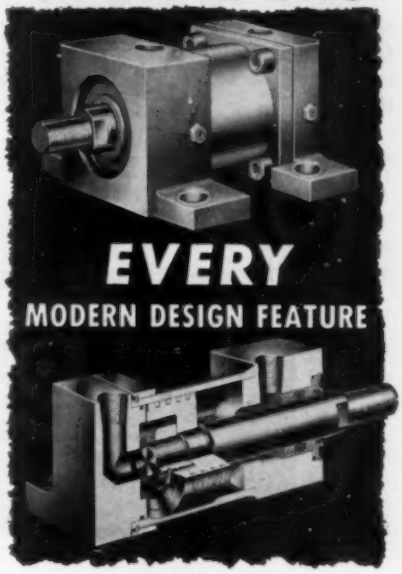
D. C. Sanford has been promoted to the position of manager of application engineering department of **The Bristol Co.** Mr. Sanford, who has been associated with the firm's sales engineering organization since 1937, has more recently held the post of an application engineer with headquarters at the main offices in Waterbury, Conn.

•

Five changes in Norton Co.'s outside sales personnel have been announced. Steward J. Bell, abrasive engineer in the western Michigan area will retire after almost 40 years with Norton. He will be succeeded by Allen C. Moore, formerly of the Detroit office Sales Engineering Dept.

Harlan W. Cobb, presently office manager Cleveland, is now a field engineer covering the area serviced by that

HYDRAULIC CYLINDERS

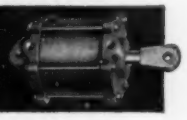


• 2000 p.s.i.
• Compact design
• J.I.C. Standards
• 11 models in 11 sizes
• Up-to-date engineering
• All steel construction
• Wide choice of rod sizes
• Quick-change packing cartridge



S-P makes hydraulic cylinders for the world's largest corporations. Representatives in principal cities. Prompt deliveries. Send for copy of S-P Catalog No. 103.

S-P AIR CYLINDERS



Famous for long life—low downtime. Piston packings "replace" themselves. Prompt deliveries. Send for Catalog 102.

OTHER S-P PRODUCTS: Power Chucks, Rotating Air Cylinders, Parallel Grip Collet Chucks, Drill Press Chucks, Expanding Arbors, Blank Jaws, Air Valves, Air Pistons, Air Control Accessories.

THE S-P MFG. CORP.
ESTABLISHED 1915
12415 EUCLID AVENUE
CLEVELAND 6, OHIO
A Bassett Company

INDICATE A-10-147

Robert Geff's government contracts

branch. Philip H. Threshie, who has been a field engineer on the West Coast, has been appointed an abrasive engineer to cover that area near San Diego and as well as the state of Arizona.

Two recent sales training course graduates, Robert P. Cooper and Robert N. Hamilton have been assigned to the Los Angeles area.

•

New service for Ohio customers has been inaugurated by Frederic B. Stevens, Inc. Who have opened a customer service warehouse in Springfield, Ohio. The warehouse is being operated in conjunction with the Stevens plant in that city.

Pennsylvania Salt Manufacturing Co.'s new $8,000,000 electrolytic chlorine and caustic soda plant at Calvert City works now is in production. This is Pennsalt's largest single expansion project undertaken as part of a $12,000,000 program which also will include construction of a new synthetic ammonia unit at the company's Wyandotte, Mich.

•

Smoothex, Inc. of Cleveland has announced the sale of their super bright nickel process of Udylite Research Corp. of Detroit. The process, which utilized different organic agents, was developed in an effort to achieve an easier controlled, faster and more economical bright nickel-plating method. It is said that this process can be operated at current densities from 5 to 100 amperes per square foot maintaining fine grain structure of the electro deposit, and is adaptable for use on buffed brass, steel and copper, and on unpolished cold-rolled, fine finished or dull steel and die castings after conventional copper cyanide plating.

Smoothex will continue development work on other processes, directing the bulk of their efforts on their new bright copper program.

•

The two million dollar Cyril Bath Co. plant has been opened at Solon, Ohio. The factory formerly was located in Cleveland. The one-floor steel structure, comprising 50,000 square feet, was designed to facilitate orderly flow of material and operations. Overhead rail cranes handle up to 25 ton loads, and a special railroad spur running directly into the plant permits freight cars to be loaded or unloaded by crane inside the building. An outside storage area is similarly served by overhead rail crane.

•

West Coast manufacturers will have their own regional source of Miniature Precision Bearings, Inc. products with the erection of a branch plant by that company. Several locations in the vicinity of major industrial markets are being considered for the site of what will be the first Western branch plant in the ball bearing industry. Initial operation will consist of a pilot run comprising certain finishing and gaging operations and provide assembly and lubrication to customer specifications. Additional processes will be gradually included acording to present plan announced by company officials.

•

W. H. Brade Co., manufacturers of self-sticking industrial products has announced the move of its office and plant to its new building, 727 W. Glendale Ave., Milwaukee 12.

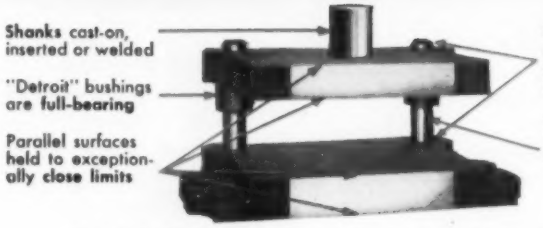
•

Three **Clary Multiplier Corp.** production executives have been appointed to fill newly created manufacturing posts and will head that company's expanding factory operations. **Elmer Harrison,** factory tooling chief, becomes production manager of the Tool and Instrument Manufacturing Div.; **Rollo Asmussen,** who will continue as general manager of Clary's Aircraft Hardware Div. in Los Angeles until appointment of a successor there, is now production manager for the business machines and general manufacturing.

YOU PAY FOR THE BEST . . .
BE SURE YOU GET THE BEST

FACTORY-BUILT IS BETTER-BUILT

When you specify "Detroit" die sets, you are assured micro-metric precision that means: 1) Lower costs in mounting die in die set and 2) Longer, trouble-free production runs. Factory-built die sets give you what you pay for—parallelism, squareness and finish.



Factory-built to the most exacting standards, "Detroit" die sets are also factory-assembled and factory-inspected. You don't have to re-work "Detroit" die sets in your shop to get the accuracy and performance you have a right to expect.

For prompt factory delivery, call "Detroit"

DETROIT	TR 2-5150	MINNEAPOLIS	PR 1822
BIRMINGHAM, ALA.	3-1341	MONTREAL, CAN.	WI 1186
BUFFALO	CI 0163	NASHVILLE	6-2597
CHICAGO	PU 5-7694	NEWARK	MA 2-4318
CINCINNATI	HU 7775	PHILADELPHIA	VI 4-4084
CLEVELAND	TO 1-0860	PITTSBURGH	LO 1-4011
DALLAS	TE 3818	ROCK ISLAND, ILL.	RI. 8-2814
DAYTON	HE 3042	ST. LOUIS	FR 6811
INDIANAPOLIS	HU 5604	SEATTLE	SE 7997
LOS ANGELES	AD 7251	TOLEDO	MA 4510
MILWAUKEE	GL 3-7170	TORONTO, CAN.	KE 2972

DETROIT DIE SET CORPORATION
2895 W. GRAND BLVD. • DETROIT 2, MICH.

DETROIT DIE SET ★

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-148

Robert Geff's government contracts head, assumes the duties of production manager of ammunition manufacturing. The positions were created in connection with consolidation of Clary's main factory operations into three major manufacturing divisions.

•

The high-tensile low-alloy steels known as "Otiscoloy" will now go by the trade name of "Jalten" according to the fabricators, Jones & Laughlin Steel Corp. Reason given for the name-change was to conform to the pattern of other J & L trade names, which include Jalloy and Jalcase.

•

A metalworking lubricant school to provide instruction in wax lubricants has been established by S. C. Johnson & Son, Inc. The school, considered the first of its kind in this country, was created to train salesmen of Johnson's distributors in the fundamentals of wax chemistry and in the use of the company's wax cutting fluids and lubricants. The program consists of a three-day series of courses under the direction of lubricant engineers and technicians presenting illustrated lectures and laboratory demonstrations. The series covers use of wax in metal forming, cutting and machining and piercing and blanking, as well as discussions of proper methods of cleaning.

•

Brookyln, N. Y. will be the location of the International Machine Tool Exposition, a permanent, continuing exhibit which will open October 5. The show, which will display some 1000 tools including production, toolroom and metal fabricating equipment, will be sponsored by S&S Machinery Co. Both American and foreign items will be shown, many for the first time, and facilities are expected to permit visitors to view tools in operation.

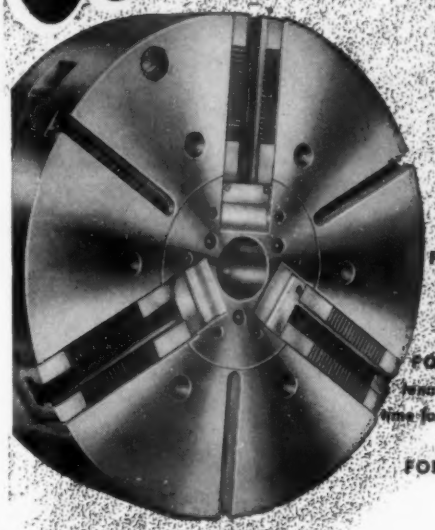
•

The V&O Press Co., Div. of Emhart Manufacturing Co., has announced appointment of two representatives. Briggs-Weaver Machinery Co., P.O. Box 5609, Dallas, will represent the company in Texas, and the McVoy-Hausman Co. 2024 Sixth Ave. N., Birmingham, will cover the Alabama territory.

•

A pioneer in the modern seamless tube industry, Mannesmann Works, Germany, has combined with a leading seamless tube mill machine manufacturer, Maschinenfabrik Meer A. D., to form a new company in this country, Mannesmann-Meer Engineering and

Whiton AIR CHUCKS



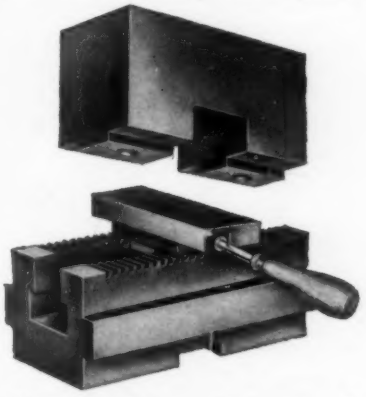
Equipped with American Standard Serrated Jaws and Whiton Micro Jaw-Sets.

FOR INCREASED PRODUCTION with less operator fatigue. Faster spindle speeds with safe, fast chucking of work.

FOR PRECISION ADJUSTMENT of chuck jaws. Maintenance of jaw settings during long runs. Less down time for adjustment.

FOR STANDARDIZED WORK-HOLDING EQUIPMENT

Whiton Air Chucks are engineered to give maximum efficiency and economy of operation. Sizes up to 12″ are wedge-actuated for high-speed spindle rotation. Larger sizes up to 36″ are lever-actuated to give maximum holding power with minimum air consumption. Chuck body and jaws are made of selected steels and heat treated for strength and durability.



Whiton MICRO JAW-SET

An exclusive Whiton feature which, in combination with the American Standard Serrated Jaws, gives Whiton Chucks the rigidity of a non-adjustable chuck and provides for extremely precise individual jaw adjustment.

Whiton SINCE 1856

THE WHITON MACHINE CO.
NEW LONDON, CONN., U.S.A.
HAND OPERATED CHUCKS · STEAM TURBINES
AIR OPERATED CHUCKS · [illegible]

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-149

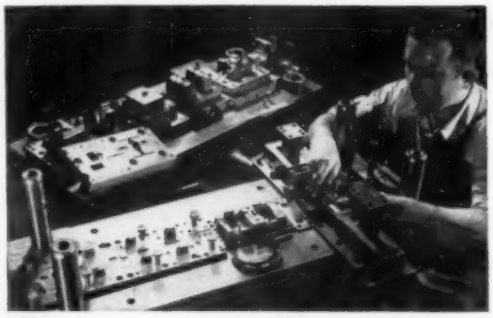


B. Jahn Production Proved Dies!

Top flight engineers specify "B. Jahn Dies" as a shortcut from drawing board to delivery date. The design and craftsmanship embodied in every B. Jahn Production Proved Die eliminates all guesswork, all trial and error — guarantees flawless die performance . . . die economy . . . die quality!

Thorough inspection of this 10 station progressive die for producing clips to link 60 caliber machine gun shells insures minimum time from production line to battle line. PRODUCTION PROVING from 10 to 50,000 pieces from the die guarantees "proving ground" quality like this —





1. B. Jahn recommends the *right* tools and dies for each specific requirement.
2. Progressive dies — single dies — tools for multiple slide machine or dial press use — are recommended only when substantial production savings can be realized.
3. B. Jahn dies are designed in sections for ease and economy of repair whenever advisable.
4. Carbide inserts are built into trouble spots and all points subjected to excessive wear for longer tool life, resulting in lower production costs.
5. B Jahn dies are ground all over after hardening, upon request, for outstanding performance and economy



SEND FOR THE "B. Jahn Story" TODAY!

B. Jahn

THE B. JAHN MANUFACTURING COMPANY, NEW BRITAIN, CONNECTICUT

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-150

Construction Co. The new firm, located in Easton, Pa., will offer a complete line of seamless tube mill machinery as well as hydraulic equipment and other special mill machinery for steel, copper, brass, aluminum and other branches of the metalworking industry. In addition, the company will offer customers a complete engineering service for planning, installation and operation of seamless mill machinery.

•

Aaron Wexler has been appointed manager of the magnetics and solid state physics department of **Westinghouse Research Laboratories.** Dr. Wexler, who has been associated with Westinghouse since 1947, has received international recognition for his studies of electrical and magnetic properties of metals at very low temperatures.

•

October 1 is the opening date scheduled for the Thor sales and service factory branch office in Atlanta, Ga. The office, which will serve distributors and users in Georgia, South Carolina and Florida, will be the sixth new factory branch established by the company since the end of World War II.

•

Consolidated Machine Tool Corp., wholly-owned subsidiary of Farrel-Birmingham Co., Inc. has announced the election of Roger E. Vaughan to its board of directors. Mr. Vaughan, who was elected executive vice-president this past April, was formerly assistant general manager of the Farrel-Birmingham plant at Buffalo and later general manager of the Consolidated Machine Tool plant.

•

John H. Harper has been made chief staff engineer for **Acme Steel Co.**'s Riverdale plant in Illinois. In this position, Mr. Harper will be in charge of an additional service engineering for the firm's management staff. The service will include preliminary surveys, layouts, analyses, estimates and proposals on major engineering projects.

•

Construction is now near completion on a new plant at El Segundo, Los Angeles County, Calif., for Alloy Rods Co. The facility, to be known as the Pacific Coast Div., is scheduled to produce a complete line of alloy arc welding electrodes and will serve the Pacific Coast and Rocky Mountain states. Full operation is anticipated by October 1, company officials stated. Supervision of the facility will be the responsibility of

George M. Holmann, now production manager of the York plant.

At the same time, announcement was made that the present Alloy Rod plant in York is being enlarged to double existing production facilities.

•

Muratet & Co. of Tulsa Okla., has been named to represent Size Control Co. north of latitude 35° in Oklahoma.

•

Wagner Brothers, Inc. has announced the appointment of **Theodore C. Smolinski** as director of technical service. Mr. Smolinski who joined the Wagner organization last spring, previously worked on plating and chemical problems for Oldsmobile, Packard and Ainsworth Manufacturing.

•

Austin Goodyear, general manager of the rubber and conveyors divisions of **Hewitt-Robins, Inc.,** has been elected a vice-president of the company. Mr. Goodyear has been associated with Hewitt-Robins for the past 12 years, and has been a director of the company for the past year.

•

Leschen Wire Rope Div. of H. K. Porter Co., Inc. has announced the appointment of Russell J. Dickson as general sales manager. Mr. Dickson, who has been with Leschen for more than three years as Chicago district manager, will be in charge of the company's sales activities.

•

Recent formation of the tungsten Institute has been announced by W. Lunsford Long of Warrenton, N. C., president of the new organization. The move is undertaken to foster progress in the tungsten mining industry, promote use of tungsten and afford the means of cooperation between this mining industry and the Federal Government in matters promoting national defense and national concern, and to promote mutual improvement of its members and the study of metallurgy of and the arts and sciences connected with the tungsten industry.

Mr. Long stated any individual or company engaged in production of tungsten concentrates from domestic mines or owning American tungsten deposits is eligible for membership in the Institute.

Besides Mr. Long, who is vice-president and general counsel of Tungsten Mining Corp., officers include Charles H. Segerstrom, Jr., as vice-president, who also is president of Nevada-Massachusetts Co., and James A. White, executive secretary and treasurer who will be in charge of the Institute's Washington office at 1757 K St., N. W.

NOW, DUMORE DRILL HEAD makes every drill operator an expert!

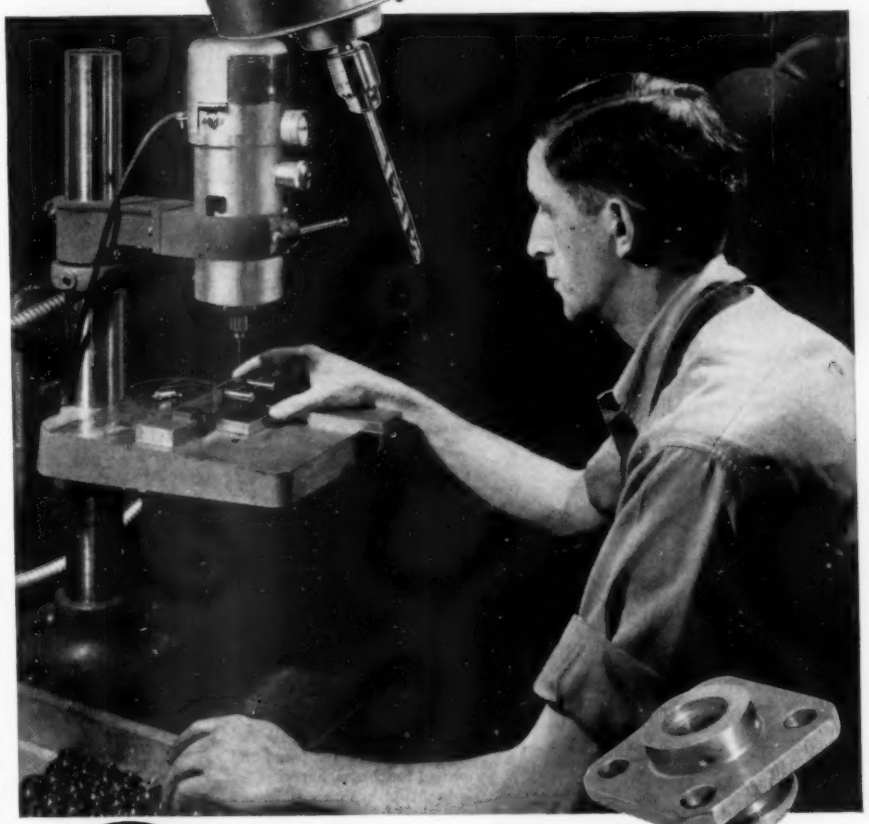


THE new Dumore Automatic Drill Head does away with operator guesswork — the new *resistance drilling* way. *High drill breakage losses are virtually eliminated by this remarkable new tool.* It produces premium quality, small diameter deep holes, even with unskilled labor. And shop foremen report average drill life increases as much as 93 per cent.

Dumore's new *resistance drilling* automatically equalizes the *exact* pressure required for every stroke of the drill head . . . automatically compensates for variations in drill quality and workpiece hardness . . . factors your drill operators can't compensate for by sense of touch alone.

Depend on Dumore Automatic Drill Heads — *and get big savings in drill costs,* quality workmanship plus production increases.

Get all of the advantages of this remarkable shop tool. Ask your nearby industrial distributor for a demonstration, or write the Dumore Company.



Holes for airplane parts are produced 12 times faster at a 97% cost reduction with this setup. In fact, the Dumore Drill Head paid for itself after only 4½ hours operation.

DUMORE PRECISION TOOLS

The Dunmore Company

1325 Seventeenth Street • Racine, Wisconsin

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-151

TRADE LITERATURE

For Free Booklets and Catalogs—Convenient Request Card on Page 165

Copper

Results of 27-years research and field study of corrosion as it affects copper and copper alloys are available in 28-page booklet B-36R, "Corrosion Resistance of Copper and Copper Alloys," explaining chemical and physical nature of corrosive attack in various forms; tabulates relative corrosion resistance of principal types of the metal in contact with 183 corroding agents, and also presents further revised and more complete information on this subject. **The American Brass Co.,** Waterbury 20, Conn. **L-10-4**

Milling Machines

Widely illustrated brochure presents line of Cervinia milling machines, stressing their performance, precision and capacity. **Misal Machinery, Inc.,** 1 East 53rd St., New York 22.

L-10-2

Cam Automatics

Folder presents illustrated information concerning company's all-mechanical cam automatics, stressing speed and accuracy; drawings explain details. **The Motch & Merryweather Machinery Co.,** Penton Bldg., Cleveland 13.

L-10-3



Choose Your Wrenches as you do your friends--for life

Specify ARMSTRONG Wrenches for lifetime service, for finely balanced tools that feel right in the hand and make work easier, faster and less fatiguing. ARMSTRONG Wrenches generally are longer for size—give greater leverage. Accurately milled or broached openings give the proper clearance. They are safe wrenches because they are strong beyond need.

Drop forged and machined from high tensile carbon or special alloy tool steels, ARMSTRONG Wrenches are heat treated, tempered and tested to an exact balance of toughness, hardness and tensile strength. Each is beautiful in finish and line, is a quality tool to be proudly possessed by any mechanic—or certain to "give a lift" to any assembly line. Buy wrenches which carry the trade marks HI-TEN or ARMALOY. On carbon or alloy steel wrenches these trade marks are your guarantee of lifetime quality.

WRITE FOR CATALOG

ARMSTRONG BROS. TOOL CO. "The Tool Holder People" 5257 W. ARMSTRONG AVENUE CHICAGO 30, ILL.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-152

Broaching

Circular 502 describes recently introduced line of heavy duty horizontal hydraulic broaching machines, equipped with electrical push button controls; well illustrated, shows close-up views of special features. Includes tabulated specifications. **American Broach and Machine Co.,** Ann Arbor, Mich.

L-10-1

Vacuum Furnace

Folder "Vacuum Furnaces and Their Application to the High-Vacuum Processing of Metals" discusses in detail various processes carried out in three types of vacuum furnaces; also explains economies and other advantages possible through their use. **F. J. Stokes Machine Co.,** Vacuum Equipment Div., 5500 Tabor Rd., Philadelphia 20.

L-10-5

Drives

Well illustrated Catalog V-1000 presents Pyott Vee-Tex belts and sheaves; contains extensive reference information such as specification and dimension tables, V-belt comparison table, data on speeds and horsepowers and other engineering information. Request direct from **Pyott Foundry and Machine Co.,** 328 N. Sangamon St., Chicago 7.

Hard Facing

Comprehensive and analytical study of hard facing, its application and wear-resisting qualities against impact and abrasive conditions, presented in 52-page brochure; also incorporates data and instructions on hard facing as well as information on company's own line of hard facing metals. Special section gives recommendations for specific hard facing rods for more than 1000 individual pieces of equipment. Illustrated. **Mir-O-Col Alloy Co.,** 312 North Ave. 21, Los Angeles 31. **L-10-6**

Foundry Operation

Two-page questionnaire, "Profact Foundry Check List" provides simple, efficient analysis of foundry operations, which will point out weak spots in production equipment and methods; may be used by ferrous or nonferrous foundries; developed by engineers with extensive experience in foundry design and materials handling engineering. **Fischer & Associates,** 5209 Euclid Ave., Cleveland 3. **L-10-7**

MEASURE IN MICROINCHES

Vital Operations Saved

Machining Mica

Controls

Revised handbook, "Cutting Production Costs with Electronic Controls" covers this subject for engineers, and production and management executives; includes 46 case studies to provide facts on how specific problems in this field have been solved. **Photoswitch Inc.**, 77 Broadway, Cambridge 42, Mass. **L-10-8**

OBI Presses

Catalog 58L describes line of inclinable presses equipped with mechanical sleeve clutches. Extensively illustrated with photos, drawings and diagrams showing special features and construction of equipment; includes tables of specifications. **Niagara Machine & Tool Works**, 637-697 Northland Ave., Buffalo 11, N.Y. **L-10-9**

Materials Handling

Pocket size 100-page Junior Catalog 535 describes and illustrates line of equipment for "floor level" handling; lists dimensions and specifications for each type equipment, and outlines main features and advantages. **Barrett-Cravens Co.**, 4609 S. Western Blvd., Chicago 9. **L-10-10**

Small Power Tools

Power tools for cutting, shaping, drilling and finishing wood, metal, fiber and plastics described and illustrated in 52-page catalog 53 which outlines main advantages and features. **Boice-Crane Co.**, 934 Central Ave., Toledo 6, Ohio. **L-10-11**

Friction Clutches

Illustrated engineering data sheet, Form S31-53, describes line of torque-limiting slip type friction clutches and explains their particular features and advantages; includes tables of specifications for standard Morse Type A plain plate roller chain sprockets that can be used with these clutches. **Morse Chain Co.**, 7601 Central Ave., Detroit 10. **L-10-12**

Control, Pneumatic

Catalog 8950 illustrates and provides specifications for variety of accessories for pneumatic control applications; includes air pressure regulators, air filters, pneumatic relays and switches, valve positioners and other functional equipment. Also gives data on control piping systems, and computing of air capacities. **Minneapolis Honeywell Regulator Co.**, Industrial Div., Wayne and Windrim Aves., Philadelphia 44. **L-10-13**

Gaging

Illustrated 24-page booklet describes Plunjet gaging cartridges and discusses the wide variety of applications possible; photos and drawings clarify special points. **The Sheffield Corp.**, Dayton 1, Ohio. **L-10-14**

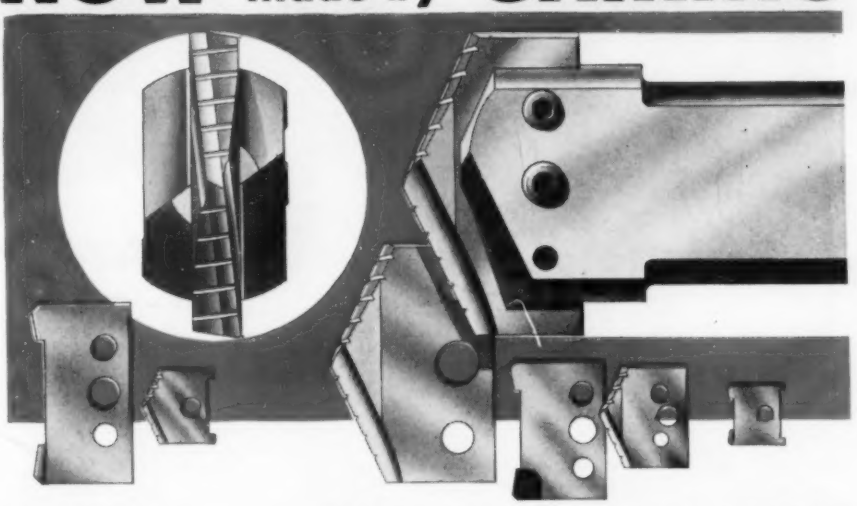
Materials Handling

Handling methods with company's tongs and C hooks are described in 24-page brochure; extensively illustrated by drawings and photos showing wide range of applications and various advantages of operation. **Heppenstall Co.**, 4620 Hatfield St., Pittsburgh 1. **L-10-16**

Air Valves, Clamps

Catalog shows complete line and replacement parts available for air valves and clamps; Illustrated with photos and drawings. Includes price lists. **The A. K. Allen Co.**, 57 Meserole Ave., Brooklyn 22, N. Y. **L-10-17**

NOW made by GAIRING



Drill Large Holes from the Solid with Interchangeable Spade Drills

Made in 256 cutter sizes, 1 to 5 inch diameter, in steps of 1/64, Conner type Spade Drills drill the required diameter in one operation, need no retracting to clear them of chips. Only eight sizes of holders are needed to handle all cutter sizes.

For general purpose work and in the Tool Room, use the cutter and holder assembly shown above. It is a rugged tool of great rigidity, recommended for large holes of medium depth.

For Production Drilling (for repetitive work), and for the somewhat deeper holes, use Conner type Oil Hole Holders designed for easy coolant flow and fast chip expulsion.



For Boring: Core Drill Cutters, for semi-finishing of cored and drilled holes, are made in the same 256 sizes, to fit the same spade drill holders.

The Gairing Tool Company is now the exclusive manufacturer of the Spade and Core Drills, both standard and special, formerly made by the Conner Tool & Cutter Company.

Send for Catalog and Price List

GAIRING TOOLS

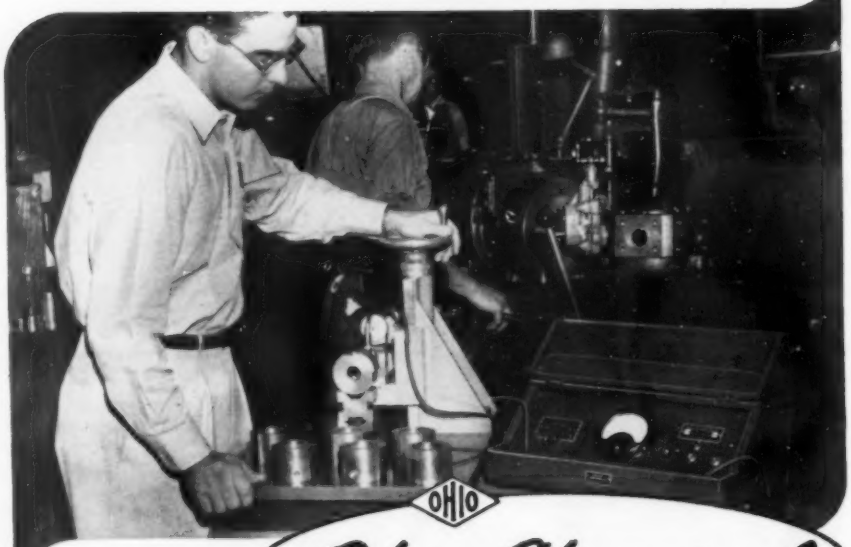
In Canada: A. C. Wickman (Canada) Ltd., Queensway, Toronto 14

The GAIRING TOOL COMPANY • 21223 Hoover Road • Detroit 32, Michigan

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-153

MEASURE IN MICROINCHES

Vital Operations Saved On Operating Tables



because Ohio Chemical uses the PROFILOMETER

The Ohio Chemical & Surgical Equipment Co. (a division of Air Reduction Co., Inc.) of Madison, Wisconsin is one of the country's largest suppliers of operating tables, other surgical equipment and medical gases. It is essential to Ohio that absolute precision of component parts of such surgical equipment be maintained for trouble-free operation at all times.

A typical example is the manufacture of electric-hydraulic operated surgical tables.

On the piston and piston cylinder operating table assembly, Ohio finds that proper functioning depends on precision surface finishes for smooth operation. Specifically, the "O"-ring of the hydraulic cylinder must be maintained to a precision surface finish for silent and effortless raising and lowering of the table—thus preventing the possibility of shock to patients during an operation.

Ohio depends on the Profilometer for accurate checks on all hydraulic surfaces. "The Profilometer gives on the spot surface roughness measurement and has saved the re-working of parts which previously failed in assembly due to surface finish," says Ohio.



Today, the Profilometer provides the fastest, simplest and most versatile means of obtaining dependable roughness ratings for all surfaces from a fraction of a microinch to 1000 microinches.

In your plant, too, the Profilometer can offer exceptional advantages as an all important shop tool.

To learn more about the Profilometer, write today for this free bulletin—"Practical Features and Applications of the PROFILOMETER". Micrometrical field representatives, traveling throughout the United States, will be pleased to show you an actual demonstration of the Profilometer at your request.

Profilometer is a registered trade name

MICROMETRICAL
MANUFACTURING COMPANY
formerly PHYSICISTS RESEARCH COMPANY
Instrument Manufacturers

ANN ARBOR 10 MICHIGAN

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-154

Machining Mica

Comprehensive 23-page manual "From One Machinist to Another" gives reference and operation information on machining of glass-bonded mica; data is based on actual plant experience; divided into four sections,—the general picture, dos and don'ts, troubles which may be avoided, and how to perform specific machining operations. Complete index makes all information quickly available. **Mycalex Corp. of America,** Clifton, N. J. **L-10-18**

Welding

Eighteen recent welding developments are described in magazine-type publication TIS 1621; includes welding materials used in maintenance as well as production on all metals at various application heats. **Eutectic Welding Alloys Corp.,** Dept. P, 40-40 172nd St., Flushing 58, N.Y. **L-10-19**

Files

Sixty-four page catalog covers company's full line of files and provides a handy reference for users of these tools. Six other catalogs present detailed information on special types: Swiss Pattern, Nucut American Pattern, Vixen Milled Curved Tooth, American-Swiss Swiss Pattern, and the American-Swiss American Pattern. **Heller Brothers Co.,** New Comerstown, Ohio. **L-10-20**

Cutting Wheels

Booklet "Cutting-Off Wheels" covers usage, classification, machine and wheel speeds and mountings in addition to information on techniques and handling of the work; drawings and photos supplement text. **Grinding Wheel Institute,** 2130 Keith Bldg., Cleveland 15. **L-10-21**

Aluminum

Company's publication, No. 21 of "Technical Advisor", offers features and articles on designing with aluminum including details on effecting weight savings as well as informative data on aluminum in other fields. Request directly on company letterhead, to **Reynolds Metals Co.,** 2500 S. Third St., Louisville 1.

Cylindrical Grinding

Brochure describes company's 418 plain cylindrical grinding machine designed for fast, economical close-tolerance short run or production grinding of small parts. Illustrated, to show unit's operating advantages. Includes specifications. **The Van Norman Co.,** Springfield 7, Mass. L-10-22

Production News

Welding

Recent edition of Weld

Automatic Control

Eight page brochure No. 155 describes workings, operating principles, main features and advantages of self-contained hydraulic controller for automatic pressure, flow and proportioning control; includes diagrams and specifications. **Askania Regulator Co.,** 240 E. Ontario St., Chicago 11. **L-10-23**

Measurement

Folder 652 presents information on "Center-Mike" for measuring center distances regardless of hole sizes; gives details of technique; illustrated. **Sorensen Center-Mikes, Inc.,** 264 Kossuth St., Bridgeport 8, Conn. **L-10-24**

Thread Inserts

Bulletin 652 presents extensive data on inserts for tapped threads emphasizing their uses and advantages; includes design data, specification tables; extensively illustrated with engineering drawings. **Heli-Coil Corp.,** Danbury, Conn. **L-10-25**

Diamonds

"The Diamond That Pays For Itself" shows applications of industrial diamonds throughout all segments of industry. Well illustrated, contains wide variety of information presented in non-technical manner. **Industrial Diamond Association of America, Inc.,** 124 E. 40th St., New York 16. **L-10-26**

Profile Milling

Sixteen-page Bulletin 1140 describes and illustrates the Model A-72 InvOmil, a profiling milling machine for high spindle speed and high feed nonferrous metal milling; offers technical information on design, construction and machine movement. **Onsrud Machine Works, Inc.,** 3927 Palmer St., Chicago 47. **L-10-27**

Turret Lathe

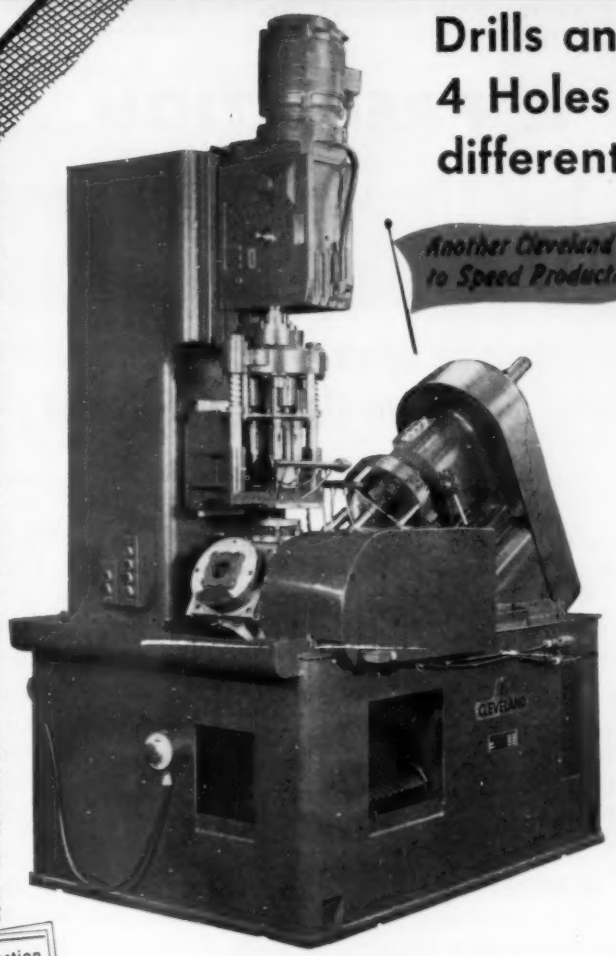
Informative Bulletin 145 deals with company's 3-U Speed-Flex automatic turret lathe. Well illustrated with drawings and close-up views of special features. **Potter & Johnson Co.,** Newport Ave., Pawtucket, R. I. **L-10-28**

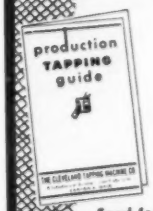
Beryllium

Twenty-page booklet, "Berylco Product Directory," covers alloys in this field available from company; outlines characteristics, qualities, available forms and uses. **The Beryllium Corp.,** Reading, Pa. **L-10-29**

343 pcs. per hour!

Drills and Taps 4 Holes in 12 different parts





Send for your copy of this Guide

The power driven 6 station drum index unit of this new Cleveland machine is designed to accomodate 12 different parts. No clamping is required—the parts automatically drop off into a chute. The 4 spindle multiple head is adjustable. Estimated production at 100% efficiency is 343 pieces per hour.

With the precision lead screw feed more perfect pieces per hour are possible on Cleveland machines. By combining several operations in one machine and tapping groups of holes at one stroke Cleveland engineers are able to realize greater speed with proportionately lower operating costs.

It will pay you to put your production problems up to Cleveland engineers. Their know-how has never failed to cut production costs.

Write today for Catalog No. TL-104

THE CLEVELAND TAPPING MACHINE CO.

A Subsidiary of AUTOMATIC STEEL PRODUCTS, INC.

CANTON 6, OHIO

For Better Tapping - - Faster!

CLEVELAND lead tapping machines screw



FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-155

Production News

ABOUT *Lusol*—THE ALL-CHEMICAL METAL-WORKING SOLUTION

FROM F. E. ANDERSON OIL COMPANY, INC. • PORTLAND, CONNECTICUT

A PREDICTION on the shop of the future

No head colds—No dermatitis—
No offensive odors—Clean floors—
Clean hands and clothing—Fresh air

Working conditions in the shop of the future will be as attractive as your office. Labor will have little cause for complaint. Production will move smoother and faster. Good housekeeping will help hurry along that happy day—good housekeeping furthered by the use of Lusol in your machine tools.

REDUCE ABSENTEEISM . . . Lusol won't irritate workers' skin; it's as safe as soap. Lusol doesn't smoke, even under extreme pressure on high-speed cutting operations; there's less likelihood of head colds and the general atmosphere is brighter. There's nothing about Lusol, in a machine that's kept clean, to cause disagreeable odors.

BOOST EFFICIENCY . . . Workers like the neatness of shops where Lusol is employed. Machines kept clean and served by this all-chemical metal-working solution don't gum up; Lusol actually removes old sludge. Floors stay cleaner; Lusol isn't oily, so you don't have the expense of non-slip compounds. Wives of workers newly introduced to Lusol have been known to say, "You must have a new job; your clothes stay so clean now."

SPEED PRODUCTION . . . Lusol's more rapid cooling permits much higher speed machining. The less frequent tool grinding and fewer grinding wheel dressings required, the elimination of degreasing operations, all contribute to faster output by men and machines. Your costs are lower because production is higher.

THIS FREE BOOK

. . . gives case histories supporting the above statements. It also tells you how to clean machines and put Lusol to work in them. For a copy, write F. E. Anderson Oil Company, Inc., Box 213-K, Portland, Connecticut.



F. E. ANDERSON OIL COMPANY, INC.
Box 213-K, Portland, Connecticut

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-156

Welding

Recent edition of Weldirectory 46 covers hard surfacing, offering extensive practical information; includes comparison chart to give comparison between types of hardsurfacing material to permit selection of best material for particular service; a guide for selection of electrodes, and information on hardsurfacing fluxes. Well illustrated. **The Lincoln Electric Co.**, 22801 St. Clair Ave., Cleveland 17.
L-10-31

Tap Chucks

Bulletin sheet No. 1E discusses balanced visible grip tap chucks for taps ranging from No. 0 to 1 inch, outlining special features and advantages. Gives specifications. **Ettco Tool Co., Inc.**, 594 Johnson Ave., Brooklyn 37, N. Y.
L-10-32

HSS Milling Cutters

Fifty-two page pocket-size condensed Catalog No. 2 contains data on line of standard solid high-speed steel milling cutters and end mill holders; also includes details on new developments. Each item carries picture, description and specification table. **Goddard & Goddard Co.**, 12280 Burt Rd., Detroit 23. **L-10-33**

Lubricator

Bulletin NB-11 presents details on speeding production with solenoid-operated lubricator, and outlining its use and advantages through case-history evidence. Illustrated. **Bijur Lubricating Corp.**, Rochelle Park, N. J.
L-10-34

Knurling Tools

Line of self-closing knurling tools are described in bulletin sheet giving sizes, dimensions and prices; explains main features and advantages of these tools. **Barnaby Manufacturing Co., Inc.**, 74 Knowlton St., Bridgeport 8, Conn.
L-10-35

Lathe Attachments

Brochure presents line of accessories and productive attachments for Nebel engines and lathes; includes information on hydraulic duplicating attachment. Well illustrated to show items in place for operation. **The Nebel Machine Tool Co.**, Cincinnati 25.
L-10-36

Coolant Filters

Folder contains information on line of coolant filters for Gardner grinders. Includes data on late model machines and filters offered as optional equipment. Illustrated. **Industrial Filtration Co.**, Dept. 298, Labanon, Ind. **L-10-37**

Thread Rolling

Literature containing engineering data offered as source of comprehensive technical information on thread and form rolling for design and process engineers. Covers advantages and applications of rolled threads, equipment and tools required; rollability of materials, preferred forms for rolling and other pertinent aspects. Extensively illustrated with drawings to clarify explanations. **Reed Rolled Thread Die Co.,** P.O. Box 350, Worcester 1, Mass. **L-10-38**

Welding Nickel Steels

Forty-four-page bulletin A-93 deals with welding nickel alloy steels; offers study of various welding techniques including some of the inert gas processes, electrodes, preheat and post-heat treatments. Outlines typical results to be expected from low alloy high-strength steels, low carbon and medium carbon engineering alloy steels and special steels. **The International Nickel Co., Inc.,** 67 Wall St., New York 5. **L-10-39**

Drills

Line of 11-inch column Mor-Speed radial drills covered in 16-page booklet; various sections deal with centralized controls; range of speeds and feeds; and special features of units, stressing main characteristics. **The Morris Machine Tool Co.,** 962 Harriet St., Cincinnati 3. **L-10-40**

Chain and Sprockets

Catalog A-624 contains information aimed primarily at helping in selection of proper roller chain and Taper Lock sprockets from company's extensive line. Includes cross-section drawing, dimensions, number of teeth, list prices, and other informative data for each item discussed in booklet. Also contains facts on roller chain drives including tables of service factors, horsepower ratings, calculation of chain length, center distances and speed ratios. **Dodge Mfg. Corp.,** Mishawaka, Ind. **L-10-41**

Pumps

Two brochures offered by company to present facts on lines of small industrial and general-purpose pumps. Catalog 101 deals with series designed for lubricating hydraulic, transfer, circulating and burning oils service. Catalog 102 presents Model C series of general-purpose pumps for use with noncorrosive liquids with lubricating qualities. Both give a pump guide which includes operating data, discuss main features and advantages, show dimensions and parts diagrams, performance curves, mounting styles and modifications of design for each model. **Tuthill Pump Co.,** 939 E. 95th St., Chicago 19. **L-10-42**

here's large size in socket screws

(larger than usually listed)

Diameters up to 1 1/2"—and larger in full range of lengths

they're part of the

CLEVELAND Top Quality line



It's good to know where you can find these unusual sizes in plain head Socket Screws, accurately made of alloy steel by modern methods—double heat treated to obtain desirable physical properties—and shipped with *threads protected.*

write for prices and delivery information

. . . In the standard range of sizes Cleveland makes plain and knurled regular Socket Heads and Flat Socket Heads. Also a wide range of sizes in Hexagon, Flat and Fillister Head Cap Screws, Square Head Set Screws, and Milled Studs.

CLEVELAND Top Quality FASTENERS

THE CLEVELAND CAP SCREW COMPANY

2949 East 79th Street, Cleveland 4, Ohio

originators of the Kaufman DOUBLE EXTRUSION Process

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-157

A SURE WAY to get fast, low-cost metal joining...



PREP

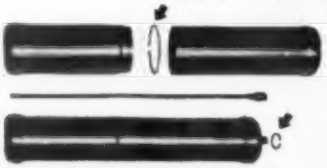
THE BRAZI

ALLOY PREPLACEMENT is a key factor in the tried and proved EASY-FLO and SIL-FOS low-temperature silver alloy brazing formula that gives you *any brazing production you want* at surprisingly low cost. It's a simple abc formula... where a = assembling parts with EASY-FLO or SIL-FOS *pre*placed at the joints... b = using a fast heating method such as oxyacetylene torch, furnace, electrical induction,

TIGHT

BOU

TWO TYPICAL





INSECTICIDE BOMB
Steel shell stampings and copper vapor tube joined with rings of EASY-FLO preplaced. Two girls turn out 120 bombs per hour.



A BRAZING PRODUCTION EXPERT IS AT YOUR CALL
Without obligation one of our field engineers will call and tell you if, where and how you can use the preplacement formula to advantage. Write and say when. *FOR FULL FACTS IN PRINT* write for a copy of BULLETIN 20...



HANDY & HARMAN
ORIGINATORS OF EASY-FLO & SIL-FOS
FOUNDED 1867 QUALITY SERVICE

HANDY & HARMAN
General Offices: 82 Fulton St., New York 38, N. Y.
DISTRIBUTORS IN PRINCIPAL CITIES

OFFICES and PLANTS
BRIDGEPORT, CONN.
PROVIDENCE, R. I.
CHICAGO, ILL.
CLEVELAND, OHIO
DETROIT, MICH.
LOS ANGELES, CAL.
TORONTO, CANADA
MONTREAL, CANADA

AT THE METAL SHOW—CLEVELAND—OCT. 19-23

SEE an actual application of the preplacement formula in action... Also many more examples of EASY-FLO and SIL-FOS production-brazed assemblies... *TALK* over your metal joining problems with our experienced engineers.

BOOTH 941

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-158

Good Reading

SIMPLIFIED DRAFTING PRACTICE *by W. L. Healy and A. H. Rau. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, N. Y. 16. Price, $5; 156 pp.*

Called a modern approach to industrial drafting, this is the trade edition of one of the General Electric Series of books written for the

THEOR
REAL V
Thielman.
Inc., 70 Fi
Price $6.6

The obj
iarize the
concepts a
functions
troduce th
mathemati

Problem
arise natu
has been
Topics co

broad purpose is to explain a method of analysis, based on the science of thermodynamics, for processes involving the control or use of energy. The first part of the text is a detailed exposition of basic facts and methods. In later chapters, consideration is given to engineering processes involving the conversion of energy from one form to another, the transfer of energy from place to place, and the storage of energy in various forms.

A wide variety of problems is included for each phase of the subject. Though the presentation is built on a theoretical basis, the material throughout is tied to concrete physical pictures. It is pointed out that practical engineering problems are never pure thermodynamic problems, but involve cost, mechanical expediency and other engineering factors.

Richa
Mac
Price

Th
ested
bides
It p
on
prop

A
cour
basi
and
of
in
per
cus

inc
on
ne

THEORY OF FUNCTIONS OF REAL VARIABLES, *by Henry P. Thielman. Published by Prentice-Hall, Inc., 70 Fifth Ave., New York 11, N.Y. Price $6.65.*

The object of this book is to familiarize the reader with fundamental concepts and methods of the theory of functions of real variables and to introduce the postulational approach to mathematical theories.

Problems are included wherever they arise naturally and special emphasis has been placed on existence proofs. Topics considered are those generally

HTLY

UND

... and Richard Kieffer. Published by The MacMillan Co., 60 Fifth Ave., N. Y., Price $10.00, 447 pp.

This book is helpful for those interested in the field of high melting carbides, borides, nitrides, and silicides. It presents full and recent information on the structure, preparation, and properties of these basic constituents.

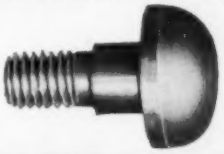
Also covered is an evaluation, by the country's leading authorities, of the basic constituents of the hard metals, and a comparison of the performance of cemented (metal bonded) products in turbine bucket and other high temperature applications as well as a discussion of refractory hard metals.

The book is an aid to metallurgists, inorganic chemists, and others working on the development of materials for new engineering uses.



★ faster set-up time...
★ faster production...
★ greater simplicity...
...ions done simultaneously...
...ning...

...ilder screw
...ds of production.



...—6 Operations	OPERATION	WITH "TRAUB"—5 Operations
Feed-out and close collet	1	Feed-out and close collet
Box-tool first shoulder	2	Turn first shoulder with single point turning tool from front slide
Box-tool second shoulder	3	Turn second shoulder with the same single point turning tool from front slide, and thread
Thread	4	Form head
Form head	5	Cut-off
Cut-off	6	NONE



Write or Phone for Free Catalogue

Guthery MACHINE TOOL CORPORATION

130 WEST 42nd STREET • TELEPHONE: CHICKERING 4-2020 • NEW YORK 36, N. Y.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-159

A SURE WAY to get fast, low-cost metal joining...

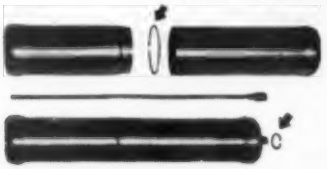


PREPLACE
THE BRAZING ALLOY

ALLOY PREPLACEMENT is a key factor in the tried and proved EASY-FLO and SIL-FOS low-temperature silver alloy brazing formula that gives you *any brazing production you want* at surprisingly low cost. It's a simple abc formula... where a = assembling parts with EASY-FLO or SIL-FOS *pre*placed at the joints... b = using a fast heating method such as oxyacetylene torch, furnace, electrical induction, gas-air burners, etc.... c = devising a production set-up that keeps assemblies moving steadily to and through the heating station. This formula eliminates the human element from the actual brazing. It assures fast, reliable production with unskilled labor.

EASY-FLO and SIL-FOS are available in rings, washers, shims and other preformed shapes to suit specific joint requirements.

TWO TYPICAL EXAMPLES



INSECTICIDE BOMB
Steel shell stampings and copper vapor tube joined with rings of EASY-FLO preplaced. Two girls turn out 120 bombs per hour.



NAVY BUZZER CASE COVER
8 posts and gasket brazed to cover with EASY-FLO wire rings preplaced. Assemblies go thru furnace 1500 a day.





A BRAZING PRODUCTION EXPERT IS AT YOUR CALL
Without obligation one of our field engineers will call and tell you if, where and how you can use the preplacement formula to advantage. Write and say when. *FOR FULL FACTS IN PRINT* write for a copy of BULLETIN 20...



HANDY & HARMAN — FOUNDED 1867 — QUALITY & SERVICE — ORIGINATORS OF EASY-FLO & SIL-FOS

HANDY & HARMAN

General Offices: 82 Fulton St., New York 38, N. Y.
DISTRIBUTORS IN PRINCIPAL CITIES

OFFICES and PLANTS
BRIDGEPORT, CONN.
PROVIDENCE, R. I.
CHICAGO, ILL.
CLEVELAND, OHIO
DETROIT, MICH.
LOS ANGELES, CAL.
TORONTO, CANADA
MONTREAL, CANADA

AT THE METAL SHOW—CLEVELAND—OCT. 19-23

SEE an actual application of the preplacement formula in action... Also many more examples of EASY-FLO and SIL-FOS production-brazed assemblies... *TALK* over your metal joining problems with our experienced engineers.

BOOTH 941

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-158

Good Reading

SIMPLIFIED DRAFTING PRACTICE *by W. L. Healy and A. H. Rau. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, N. Y. 16. Price, $5; 156 pp.*

Called a modern approach to industrial drafting, this is the trade edition of one of the General Electric Series of books written for the advancement of engineering practice. The methods outlined here depart from the old concept of drafting which permits artistically executed mechanical drawings with numerous accurately projected views. The authors say that since drafting produce drawings faster, with less effort, which are easily read and interpreted.

To accomplish this purpose, some of the principles laid down are simplification of delineation; elimination of nonessentials; extensive use of freehand drawing. It is said that tests have proved that freehand drawing, when used sensibly, is both practical and economical. Other factors being equal, this technique alone can reduce the average draftsman's drawing time by 20 to 50 percent.

The effect of the simplified principles is apparent from the many before and after illustrations.

MECHANICAL ENGINEERING THERMODYNAMICS *by David A. Mooney. Published by Prentice-Hall, Inc., 70 Fifth Avenue, N. Y. 11. Price, $9.35; 540 plus charts.*

This book's broad purpose is to explain a method of analysis, based on the science of thermodynamics, for processes involving the control or use of energy. The first part of the text is a detailed exposition of basic facts and methods. In later chapters, consideration is given to engineering processes involving the conversion of energy from one form to another, the transfer of energy from place to place, and the storage of energy in various forms.

A wide variety of problems is included for each phase of the subject. Though the presentation is built on a theoretical basis, the material throughout is tied to concrete physical pictures. It is pointed out that practical engineering problems are never pure thermodynamic problems, but involve cost, mechanical expediency and other engineering factors.

THEORY OF FUNCTIONS OF REAL VARIABLES, *by Henry P. Thielman. Published by Prentice-Hall, Inc., 70 Fifth Ave., New York 11, N.Y. Price $6.65.*

The object of this book is to familiarize the reader with fundamental concepts and methods of the theory of functions of real variables and to introduce the postulational approach to mathematical theories.

Problems are included wherever they arise naturally and special emphasis has been placed on existence proofs. Topics considered are those generally included in mathematics courses for first-year graduate students.

ENGINEERING MANUFACTURING METHODS *by Gilbert S. Schaller. Published by the McGraw-Hill Book Co., 330 West 42nd St., N. Y. 36. Price, $7; 613 pp.*

This presentation of current engineering manufacturing correlates engineering design, material and production standards, and codes. Included is an extensive discussion of economic aspects of engineering manufacturing, showing the importance of manufacturing thinking where costs predominate, and the availability of alternate methods in solutions of given problems.

Among the major aspects of manufacturing included are founding, machining, welding, hot and cold shaping, thermal treatment and engineering materials.

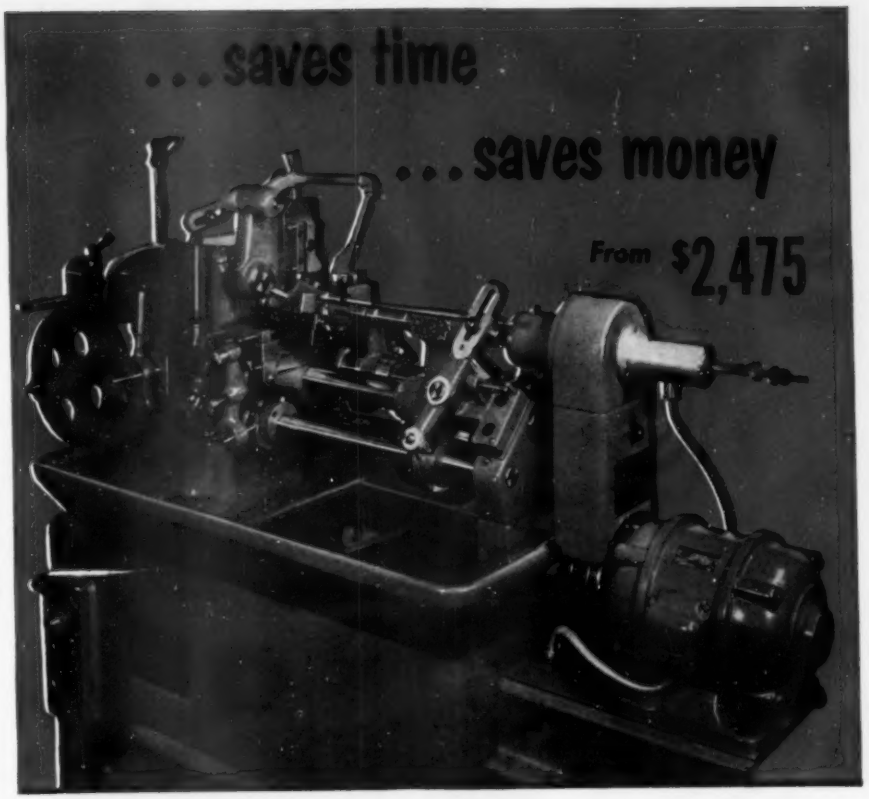
The author introduces his original work on frozen molds, along with information on shell molding, and discusses Olvine, a foundry sand.

REFRACTORY HARD METALS, *by Drs. Paul Schwarzkopf and Richard Kieffer. Published by The MacMillan Co., 60 Fifth Ave., N. Y., Price $10.00, 447 pp.*

This book is helpful for those interested in the field of high melting carbides, borides, nitrides, and silicides. It presents full and recent information on the structure, preparation, and properties of these basic constituents.

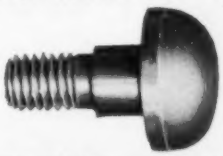
Also covered is an evaluation, by the country's leading authorities, of the basic constituents of the hard metals, and a comparison of the performance of cemented (metal bonded) products in turbine bucket and other high temperature applications as well as a discussion of refractory hard metals.

The book is an aid to metallurgists, inorganic chemists, and others working on the development of materials for new engineering uses.



TRAUB
Automatic Screw Machines

★ faster set-up time . . .
★ faster production . . .
★ greater simplicity . . .
★ multiple operations done simultaneously . . .
★ easier caming . . .



To illustrate let us consider a shoulder screw and compare methods of production.

WITH TURRET—6 Operations	OPERATION	WITH "TRAUB"—5 Operations
Feed-out and close collet	1	Feed-out and close collet
Box-tool first shoulder	2	Turn first shoulder with single point turning tool from front slide
Box-tool second shoulder	3	Turn second shoulder with the same single point turning tool from front slide, and thread
Thread	4	Form head
Form head	5	Cut-off
Cut-off	6	NONE

Write or Phone for Free Catalogue



Guthery MACHINE TOOL CORPORATION
130 WEST 42nd STREET • TELEPHONE: CHICKERING 4-2820 • NEW YORK 36, N. Y.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-159



What's your problem in power motion?

There's an Anker-Holth cylinder to solve it!

● Advanced designs of Anker-Holth power cylinders in a wide range of sizes and types are available to solve your problems involving push, pull, lift or lowering action. If standard cylinders aren't the answer, Anker-Holth matches your needs with special designs.

For help in engineered cylinder power . . . air or hydraulic . . . write Anker-Holth Division of The Wellman Engineering Company, Dept. B-5, 2723 Conner St., Port Huron, Michigan.



FREE on request . . . bulletin on complete line of Anker-Holth products.

Anker-Holth
ENGINEERED CYLINDER POWER
WELLMAN
Division of THE WELLMAN ENGINEERING COMPANY

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-160

SERVOMECHANISM ANALYSIS, *by George P. Thaler and Robert G. Brown. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd Street, New York 36. Price $7.50. 414 pp.*

This basic book presents the essentials of the mathematical theory of servomechanisms to engineers. Giving a sound grounding in analysis, the authors detail each methematical method for analyzing servo systems.

After giving a general background and a discussion of Laplace Transformation, the book explains the various equations for setting up electrical analogues of physical systems—rotational systems, thermal processes, a hydraulic system, etc.

The full treatment of transfer functions discusses plotting from equations and from the transfer-function plots. Gain systems are taken up in detail. Parallel compensators are also covered —their requirements and procedures for each type of system. How to use logarithmic coordinates in both analysis and design is thoroughly covered.

Some of the topics discussed are: resonant frequency, integral controls, classification of servomechanism systems, gain adjustment by trial and error, vector algebra for parallel compensation, and Routh's criterion. The first topics discussed are the direct and inverse Laplace transformations.

ENGINEERING VALUATION AND DEPRECIATION *by Anson Marston, Robley Winfrey and Jean C. Hempstead. Second Edition. Published by the McGraw-Hill Book Co., 330 West 42nd Street, New York 18. Price, $8. 508 pp.*

A major revision of Marston and Agg's Engineering Valuation, this volume retains all the major subject material, but is totally rewritten, rearranged and modernized. The text deals with concepts and procedures involved in the appraisal of industrial, commercial, utility and natural resources property for which it is desirable that engineers perform the appraisal. The art of appraisal and the techniques necessary in evaluation are discussed for several classes of properties such as physical, land, working capital and intangibles normally possessed by an industrial enterprise.

This edition contains a new chapter on the rate of return which offers the reader a treatment on fair rate of return. There are complete and detailed discussions on depreciation and service lives with a new approach for appraisal and accounting purposes.

The board of directors of **The Carborundum Co.** has elected **Theodore**

Promotions involving management recently made at the **Van Norman Com-**

Executive appointments made at a re-

North East West South IN INDUSTRY

Announcement from **The R. K. LeBlond Machine Tool Co.** has made known the appointment of **A. H. Davis** as works manager. Mr. Davis, who has been with the company for 18 years, was previously assistant works manager. Succeeding him in that position is **D. W. LeBlond.**

Jerold L. Welch has been promoted to the position of chief engineer for **Reed-Prentice Corp.** Previously he held the post of assistant chief engineer.

The **Kempsmith Machine Co.** has announced the appointment of **Theodore F. Eserkaln** as chief engineer. In this capacity, Mr. Eserkaln will direct an accelerated program of engineering developments. He brings to Kempsmith considerable experience in the field. He most recently has served as director of engineering at the George Gorton Machine Co. in connection with their product improvement program.



T. F. Eserkaln

G. C. Steyskal



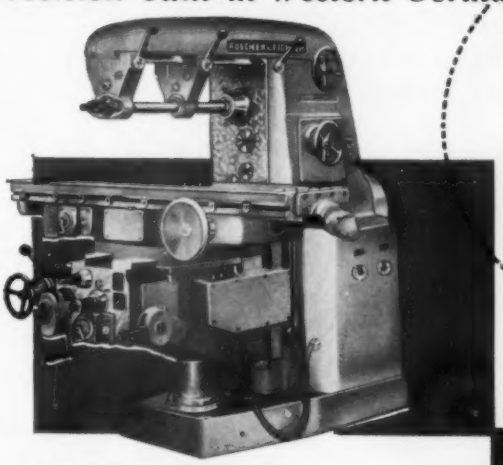
According to an announcement from **Standard Tool & Manufacturing Co., George C. Steyskal** has been appointed factory manager, with the additional responsibility of heading up the company's service department recently established. **David A. Tyo, Jr.,** newly appointed plant superintendent will assist Mr. Steyskal.

At a meeting of the board of directors of **Raybestos-Manhattan, Inc., J. H. Matthews** was appointed executive vice-president of the company. Mr. Matthews, who started with The Manhattan Rubber Manufacturing Co. in 1914, was made assistant factory manager of the Manhattan Rubber Div. in 1940 and two years later became a director of the company and assistant general manager of the division. In 1947 he was elected a vice-president of Raybestos-Manhattan.

The appointments to the staff of the Product Development Laboratory of **Acheson Colloids Co.,** included the naming of **James R. Ward** as research technician, and of **Walter D. Janssens** as research assistant. Mr. Ward formerly was employed in the research laboratory of the Diamond Crystal Salt Co., while Mr. Janssens came to Acheson from the Marchall Laboratories of E. I. duPont de Nemours & Co.

Appointment of **Paul Nesbit** as board member has been made by Leo T. Daigle, chairman of the board and president of **Cable-Link Corp.** Mr. Nesbit, who has served in executive and managerial capacities with several firms previously, was also elected to the office of treasurer of Cable-Link, with additional responsibilities as general advisor and executive assistant to the president.

Precision built in Western Germany . . .



OUTSTANDING MILLING MACHINES

With wide range of spindle speeds

Prices—Low

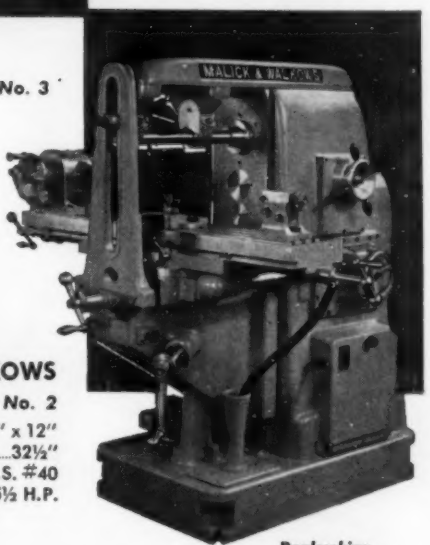
Delivery—Good

ROSCHER & EICHLER

Heavy Duty Production Milling Machine No. 3

Plain & Universal

- Fully automatic cycle.
- Single lever control.
- Rapid traverse in all directions.
- Reciprocal milling and automatic spindle stop when in rapid traverse.
- Climb milling.
- Working surface 63" x 14".
- Longitudinal travel 48".
- Motor on spindle 11 HP.



MALICK & WALKOWS

Universal High Precision Milling Machine No. 2

Working surface	48" x 12"
Longitudinal travel	32½"
Working spindle	N.S. #40
Motor	5½ H.P.

All graduations in inches.

Spare parts and service available.

Both machines have vertical heads to be mounted on column, supported by ram and bearing, *as standard equipment.*

Dealerships are available in certain territories.

Write today for full details

COLUMBIA EXPORT COMPANY, INC.

Machine Tools Division

10-35 44th Drive • Long Island City 1, N. Y. • STillwell 4-1546

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-161

The board of directors of **The Carborundum Co.** has elected **Theodore H. Booth** to the office of vice-president of the company. Mr. Booth recently was appointed general manager of the bonded products and grain division.

John D. Tebben, well known management consultant, has been elected president and chairman of the board of **Wagner Brother Equipment Co.,** organized this past spring to build electroplating equipment.

Promotions involving management recently made at the **Van Norman Company** included the appointment of **Roger L. Pyne,** who has been in charge of all activities within the Machine Tool Div., to a vice-presidency. Mr. Pyne now will concentrate on the engineering phases of that field. **Herbert L. Freer,** production planning manager, was named general sales manager in the Machine Tool Div.; and **Edward C. Hellyer,** production planning superintendent, was made production planning manager.



FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-162

Executive appointments made at a recent meeting of the board of directors of **Oakite Products, Inc.,** included the naming of **J. J. Basch,** former Philadelphia division manager, and veteran of 28 years service with the company, manager of research and product development where he will be in charge of an expanding technical research program, and supervise field testing of new and experimental materials. He has been a member of the board of directors since 1948. At the same time, **E. H. Steif,** general attorney of the company and member of the Oakite organization for the past five years, was appointed assistant secretary and elected to the board of directors.

A. J. Jones has been named chief engineer for **Landis Tool Co.** Prior to this appointment he was in charge of sales engineering. Mr. Jones, who has been with the organization for 17 years, first started there as a college trainee.


A. J. Jones

John Reich



John Reich has been advanced to the position of factory manager of **Hyster Co.'s** Danville, Ill., plant. Mr. Reich, who previously has served as factory engineer, general assembly foreman and supervisor of tool design, was most recently assistant factory manager at the Peoria plant.

According to a recent announcement from **Federal Electric Products Co., J. S. Thompson, A. A. Browne** and **T. Challoner** have been named to the board of directors. All three men also are officials of Pacific Electric Manufacturing Co., recently acquired by Federal Electric; Mr. Thompson is president, Mr. Browne is general manager and Mr. Challoner is vice-president and secretary-treasurer.

G. W. Ballantine has been named to the recently created post of manager of coated abrasives department of **Armour and Co.'s** Alliance Div. Mr. Ballantine will have full control over sales, promotion, buying and research functions. The position was instituted to put direction of all of the department's operations in the hands of one person, according to E. W. Wilson, vice-president of Armour.

Who's Meeting - and Where

Sept. 21-25. INSTRUMENT SOCIETY OF AMERICA. Instrument exposition and conference. Sherman Hotel, Chicago. Details may be had from society office, 1319 Allegheny Ave., Pittsburgh.

Sept. 29-Oct. 3. SOCIETY OF AUTOMOTIVE ENGINEERS. National aeronautic and production meeting. Hotel Statler, Los Angeles. For more information write 29 W. 39th St., New York 18.

Oct. 6. EUTECTIC WELDING ALLOYS CORP. First comparison seminar on organic bonding versus brazing and welding. Additional information and enrollment blanks may be had from the company offices, 172nd St. and Northern Blvd., Flushing 58, N. Y.

Oct. 6-7. NATIONAL FLUID POWER ASSOCIATION. Fall meeting. Sheraton Hotel, Chicago. Details are available from Barrett Rogers, executive secretary, 1618 Orrington Ave., Evanston, Ill.

Oct. 8-9. AMERICAN SOCIETY FOR QUALITY CONTROL. Eighth Midwest Conference. Masonic Temple, Davenport, Iowa. For more information, write to the society headquarters, 70 E. 45th St., New York 17.

Oct. 8-9. THE SOCIETY OF THE PLASTICS INDUSTRY, INC. New England Section meeting, Equinox House, Manchester, Vt. Direct inquiries to 67 W. 44th St., New York 36.

Oct. 8-9. ILLINOIS INSTITUTE OF TECHNOLOGY. Ninth National Conference on Industrial Hydraulics. Sheraton Hotel, Chicago. Cosponsored with Armour Research Foundation. More information may be had from the school, Technology Center, 35 W. 33rd St., Chicago 16.

Oct. 8-9. GRAY IRON FOUNDERS' SOCIETY, INC. 25th Silver Anniversary meeting, Hotel Jefferson, St. Louis. Complete details may be had from the society offices, National City - E. Sixth Bldg., Cleveland 14.

Oct. 14-16. AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Sixth annual Conference on Machine Tools, sponsored by the Sub-Committee on Machine Tools. Cleveland Hotel, Cleveland. More information may be obtained from J. C. Temin, The Ohio Crankshaft Co., 3800 Harvard, Cleveland 1.

NELCO CARBIDE TIPPED SLAB MILLS—



SET NEW PRODUCTION *Records!*

Machine Army Automatic Rifle Receivers in 1/5th the time . . . to better finishes . . . with 30 times more pieces per grind than conventional cutters!

An amazing story, but TRUE! Working on tough, scaly Perlitic Malleable iron castings, Nelco carbide tipped slab mills took a healthy .100 - .125 bite—a full 3½ inches wide—on a 3 horsepower machine at the incredible feed of 11½ inches per minute! Not only did the Nelco slab mills surpass conventional cutters in speed, *but produced better finishes, 400% more production per machine!*

HERE ARE ACTUAL PRODUCTION FACTS		
	High Speed Steel slab mill 80 RPM	Nelco carbide tipped slab mill 410 RPM
Feed (in/min)	1¾	11½
Production per machine	6 pcs. per hour	29 pcs. per hour
No. of pieces per grind	8	250 (average)
Finish	Wavy—needed extensive polishing	Superior machine finish—only minor polishing needed

Production test this amazing slab mill in your shop—Investigate NELCO today! This example is typical of the time-saving, money-saving benefits users report when using Nelco carbide tools. With nearly 800 tools regularly stocked, you can order —and GET—"special" tools at standard prices.

For full information on the *complete* Nelco line, send today for 48 page catalog.

NELCO TOOLS

For that Extra EDGE in Production

NELCO TOOL COMPANY, INC., MANCHESTER, CONNECTICUT

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-163

You'll saw **MORE METAL**

FASTER and STRAIGHTER

with a **MILFORD**

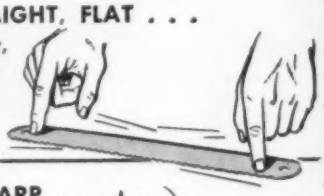
ALL-HARD

REZISTOR

POWER BLADE

and here's why . . .

BLADE IS STRAIGHT, FLAT . . .
without dish or bow, and . . . a blade must be straight to cut straight.



TEETH ARE SHARP . . .
Milford "Multiple-Pass" Milling assures sharper, more uniform teeth with smoother gullets, and it takes a sharp saw to cut really clean and fast.



PRECISION SET . . .
Side-to-side tolerance and overall set is held to close limits. Only an accurately set blade can saw straight and operate smoothly.

M-2 HIGH SPEED STEEL . . .
This is the most modern analysis of red hardness saw steel and combines full hardness with unusual toughness.

EXPERT HEAT TREATING . . .
gives a high Rockwell hardness that means a longer blade life cutting harder metals . . . plus a fine grain structure that prevents tooth chipping or crumbling under pressure.

—BUT DON'T TAKE OUR WORD
that you can't buy a better blade anywhere than a MILFORD All-Hard REZISTOR. TRY ONE on your own tough jobs in your own shop and SEE FOR YOURSELF!



STANDARD OF QUALITY THE WORLD OVER

THE HENRY G. THOMPSON & SON CO.



SAW BLADE SPECIALISTS FOR OVER 75 YEARS

NEW HAVEN 5, CONNECTICUT

PROFILE BLADES AND BAND SAW BLADES
HAND AND POWER HACK SAW BLADES

Sold through MILFORD Distributors who render a service tailored to your needs. The Industrial distributor is familiar with the requirements of industrial users in his area. His is a prompt personalized service, as near as your telephone.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-164

Oct. 16-18. Society of Industrial Designers. Annual Design Conference, Bedford Springs, Pa. Address society office, 48 E. 49th St., New York 17, for details.

Oct. 18-20. Industrial Packaging & Materials Handling Engineers. Industrial Packaging and Materials Handling Exhibit and Convention, Boston. All data concerning the event may be obtained from C. J. Carney, Jr., 20 W. Jackson Blvd., Chicago.

Oct. 19-23. American Society for Metals. National Metals Show. Cleveland Auditorium. For facts concerning the show contact W. E. Eisenman, society executive secretary, 7301 Euclid Ave., Cleveland 3.

Oct. 23-24. Armour Research Foundation of Illinois Institute of Technology. Fourth annual National Noise Abatement Symposium. Get more information from the Institute, 24 W. 33rd St., Technology Center, Chicago 16.

Nov. 9-12. Refrigeration & Air Conditioning Exposition. Public Auditorium, Cleveland. More information is available from Banner & Greif, 250 W. 57th St., New York 19.

Nov. 17. Armour Research Foundation of Illinois Institute of Technology and the Trade Association Executives Forum of Chicago will co-sponsor a conference on trade association technical problems. Technology Center, Chicago. Obtain details from the Institute office, 35 W. 33rd St., Chicago 16.

Nov. 23-28. American Vocational Association. 47th annual convention, Conrad Hilton Hotel, Chicago. Direct inquiries to Hobart H. Sommers, Chicago Board of Education, 228 N. LaSalle St., Chicago 1.

Interstate Machinery Co. will hold its fourth Interstate Machinery Fair and open house in October. The event is held annually by the company at its warehouse on 1431 W. Pershing Rd., Chicago.

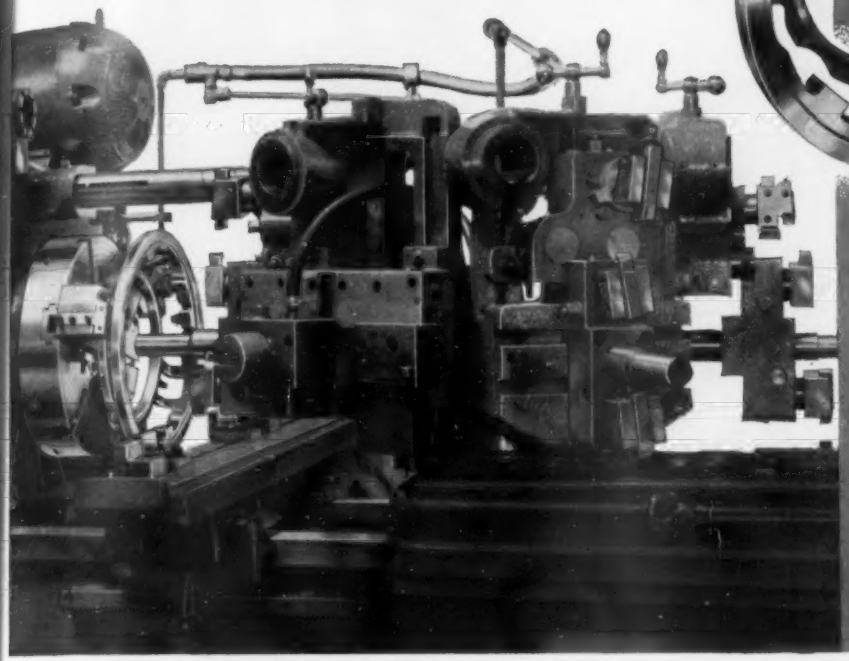
According to plan, this year's arrangements call for expansion of the Industrial Clinics introduced last year as an aid in dealing with problems affecting metalworking. A panel on press operations is being arranged as well as talks by authorities in various fields.

A detailed program may be had from the company.

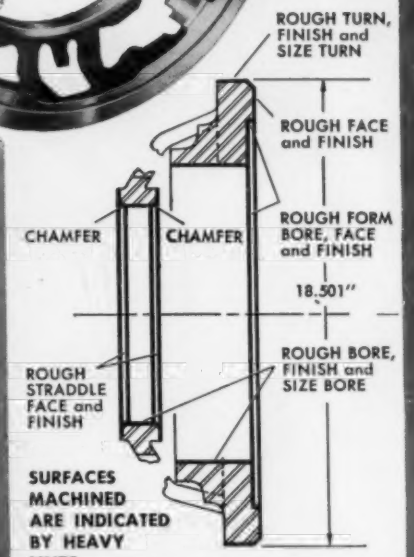
An invitational inspection equipment show is being sponsored by Production Service Co. at the Cleveland Engineering Society Hall in October.

Purpose of the show is to display actual equipment in operation that is normally too large and bulky to be shown in another manner.

DO I BETTER,
DO I *AUTOMATICALLY*

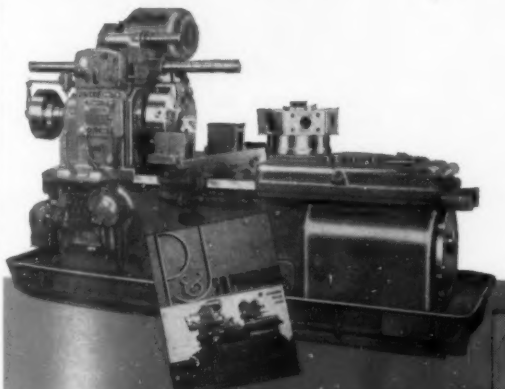






...do it on a 5-DELX POWER-FLEX Automatic Turret Lathe with P&J Tooling

For example, the steel casting shown above required *twenty* separate machining operations all of which were accurately performed in a single, fully-automatic cycle . . . thanks to P&J Tooling on a P&J 5-DELX Power-Flex. Set for most effective speeds and feeds for each cut, P&J Automatics faithfully repeat the same cycle for every work piece without the chance of operator error. Operator fatigue is greatly reduced; one man can easily tend several machines allowing maximum opportunities for divided labor costs.



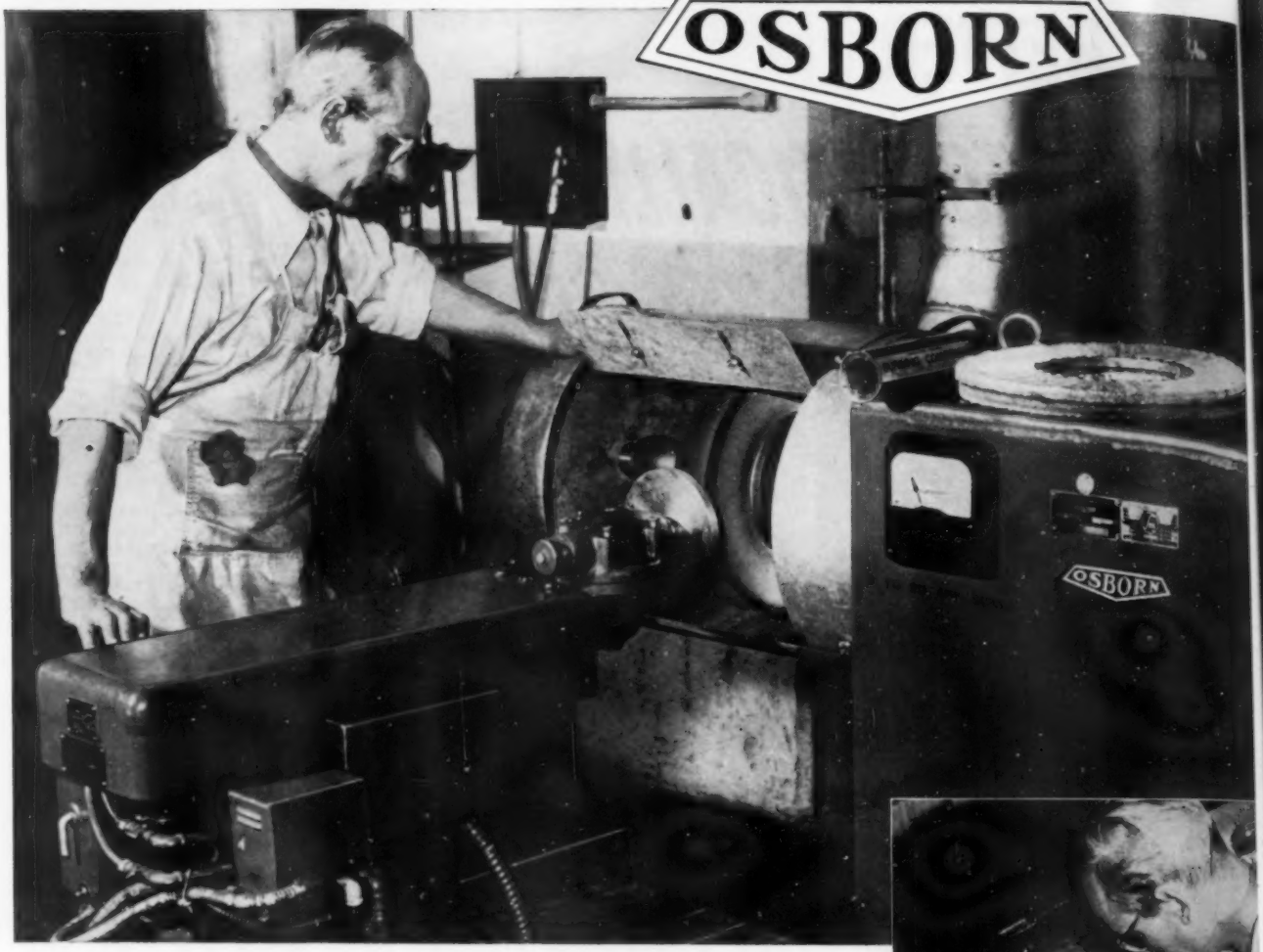
You can take guesswork out of your production picture . . . be *sure* of better work, lower costs and fewer rejects . . . when you do it automatically. Let today's outstanding production team — P&J Automatics plus P&J Tooling go to work for you. Send today for your copy of the 5-DELX Power-Flex Bulletin No. 131 — or ask P&J Tool Engineers to submit time and money-saving recommendations based on your own prints or sample parts.

WRITE DIRECT OR CONTACT YOUR NEAREST PRATT & WHITNEY BRANCH OFFICE
BIRMINGHAM • BOSTON • CHICAGO
CINCINNATI • CLEVELAND • DETROIT
LOS ANGELES • NEW YORK • PHILADELPHIA
PITTSBURGH • ROCHESTER • ST. LOUIS
SAN FRANCISCO
EXPORT DEPT., PAWTUCKET, R. I.
AGENTS: DALLAS, THE STANCO CO.
HOUSTON, WESSENDORFF, NELMS & CO.

POTTER & JOHNSTON CO.
PAWTUCKET, RHODE ISLAND
SUBSIDIARY OF
PRATT & WHITNEY
DIVISION NILES – BEMENT – POND COMPANY

P&J

OSBORN



Cuts burr removal time 50% ... greatly improves quality

Power Brushing of transmission gears removes burrs and blends surface junctures automatically. It has paid off 5 ways for a large East Coast manufacturer of aircraft parts.

Their Osborn Brushing Machine produces a uniform required rounding of .030" to .090". It accommodates gears and splines of most types, internal and external. It is easy to adjust for small gear lots and production runs of from 15 to 5,000 pieces. It eliminates costly scrap. *And* less effective hand method time was cut almost 50%.

Production bottlenecks and ineffective finishing departments in *your* plant can be reduced, often eliminated, with Osborn Power Brushing methods.

Find out how you can cut *your* costs . . . improve your workmanship. For new bulletin, Automatic Deburring, call in your nearby **O**sborn **B**rushing **A**nalyst for complete information, or write *The Osborn Manufacturing Company, Dept. K-5 5401 Hamilton Avenue, Cleveland 14, Ohio.*

Osborn Brushes



Operator can set up in a few minutes. Work is power rotated against the face of the brushes. A pre-set timer controls length of the cycle and retracts the holder.



Old method of hand burr removal was inaccurate, costly and time-wasting.

SEE THIS BRUSHING METHOD DEMONSTRATED AT METAL SHOW — BOOTH 1030

Coming Out

AT THE METAL SHOW

NATIONAL METAL CONGRESS AND EXPOSITION



KROSLOK milling cutter

BOOTH 1929

Make a note to see KROSLOK, the newest development in face milling efficiency. Rigidity, simplicity and uninterrupted, profitable service... Only three members: body, blade, wedge. Two blade types: high speed steel and carbide-tipped. Diameters—3″ through 18″.

Ask on your letterhead for new Bulletin.

THE MOTCH & MERRYWEATHER MACHINERY CO.

Cutting Tool Manufacturing Division

Cleveland 13, Ohio

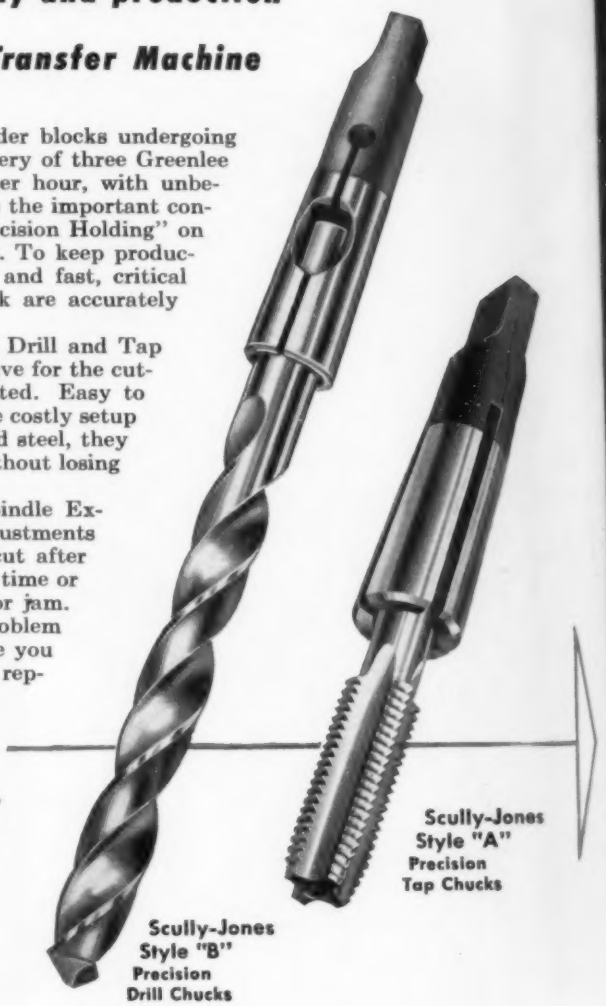
SCULLY JONES Precision Holding helps

Speeds tool changes...safeguards accuracy and production on 16-Station Automatic Transfer Machine

When you watch V-8 cylinder blocks undergoing 379 precision operations on a battery of three Greenlee Transfer Machines . . . 80 blocks per hour, with unbelievable automaticity . . . you realize the important contribution made by Scully-Jones "Precision Holding" on the business end of Greenlee spindles. To keep production flowing, tool changes are simple and fast, critical adjustments between spindle and work are accurately maintained.

Greenlee engineers chose Scully-Jones Drill and Tap Chucks to provide a positive, accurate drive for the cutting tools on this 16-station unit illustrated. Easy to insert and eject from the spindles, they save costly setup time. Ground concentric from Mar-tempered steel, they eliminate hole distortion, last indefinitely without losing accuracy.

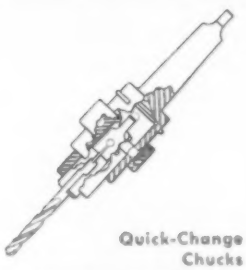
Scully-Jones Quick-Lock Adapters and Spindle Extension Assemblies provide individual, fine adjustments for each spindle, maintain accurate depth of cut after tool sharpening. There's no guesswork, no waste time or effort because these precision tools do not bind or jam. No matter what your tool holding or driving problem may be, Scully-Jones "Precision Holding" will give you a better, more accurate job! See your Scully-Jones representative or stocking distributor for quick service.



STYLE "B" DRILL CHUCKS for straight shank drills, reamers, and similar tools, save tool life, work to close centers, speed tool changes, give guaranteed accuracy, resist nicking and burring over a lifetime of hard service. Complete stocks available.

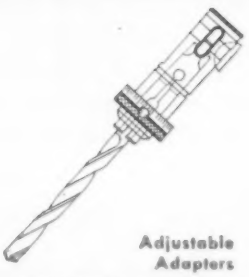
STYLE "A" TAP CHUCKS eliminate bell-mouthed and oversized tapped holes, save costly setup and downtime, work to close centers, last indefinitely under heavy stresses and loads. Complete stocks available.

THERE'S A SCULLY-JONES PRECISION TOOL FOR EVERY HOLDING OR DRIVING NEED



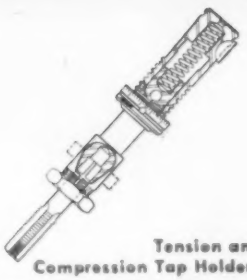
Quick-Change Chucks

Change tools in "seconds" without stopping spindle. Speed production. Hold collet firmly, give positive drive.



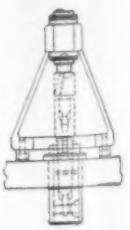
Adjustable Adapters

Permit accurate adjustments in cluster of spindles. End guesswork on fine adjustments. Speed tool changes.



Tension and Compression Tap Holders

Prevent tap and spindle damage by compensating for variations of feed between spindle and tap.

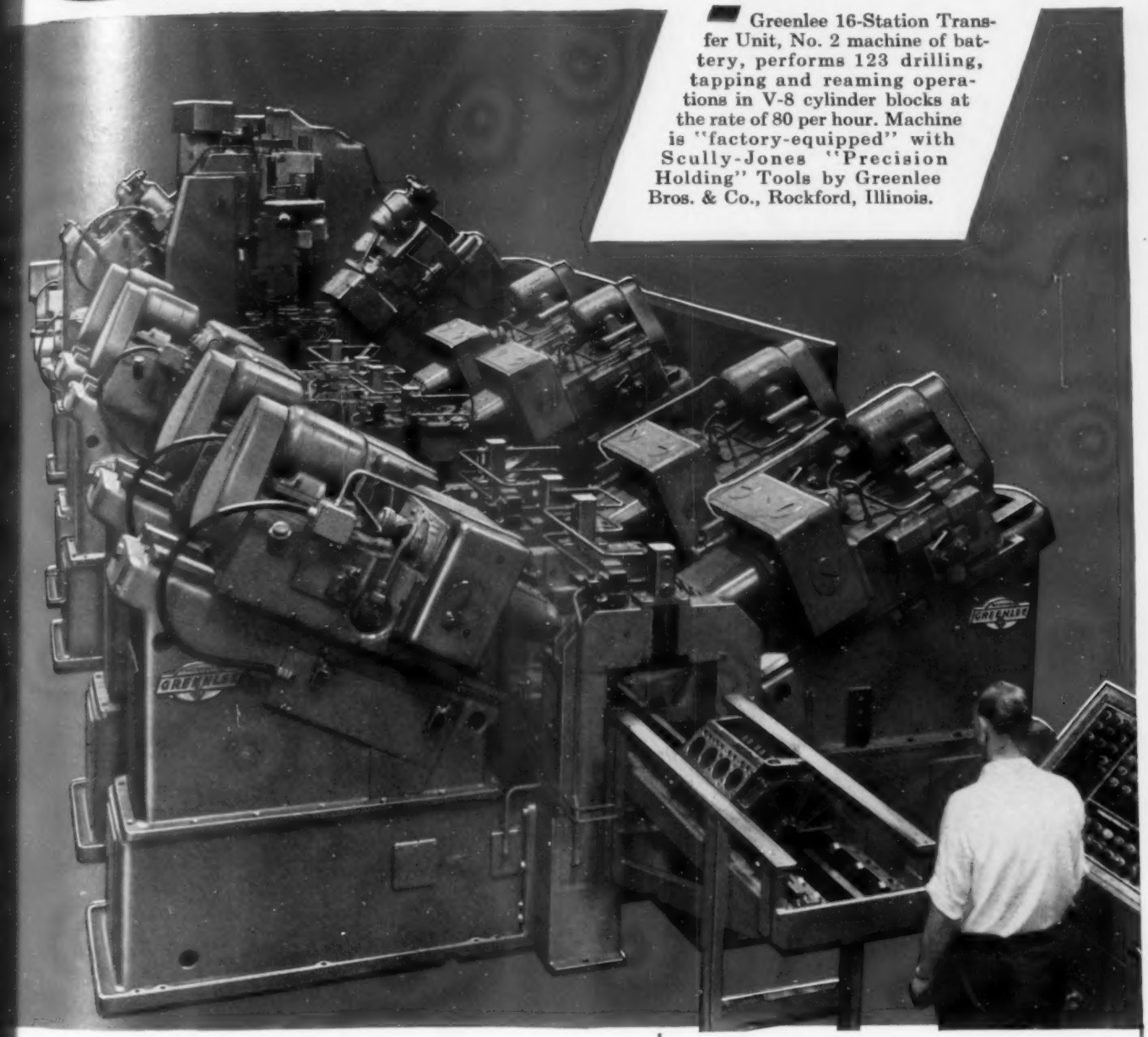


Preset... Gauges

Standard height and flush pin gauges reduce setup time 50% or more on multiple spindle machines.

GREENLEE PRODUCTION MACHINERY

"robotize" production!



Greenlee 16-Station Transfer Unit, No. 2 machine of battery, performs 123 drilling, tapping and reaming operations in V-8 cylinder blocks at the rate of 80 per hour. Machine is "factory-equipped" with Scully-Jones "Precision Holding" Tools by Greenlee Bros. & Co., Rockford, Illinois.

SCULLY JONES

Precision Holding

FOR HOLDING PRECISION

Scully-Jones and Company, 1915 South Rockwell Street, Chicago 8, Illinois

MORE FACTS—Send for free catalog describing Scully-Jones "Precision Holding" Tools. Paste coupon to letterhead or post card and mail today.

Gentlemen: I'm interested in learning more about Scully-Jones Tools.

☐ Please send Bulletin No. 1-50 describing Drill and Tap Chucks.

☐ Send catalog on your complete line.

Name_____

Company_____

Address_____

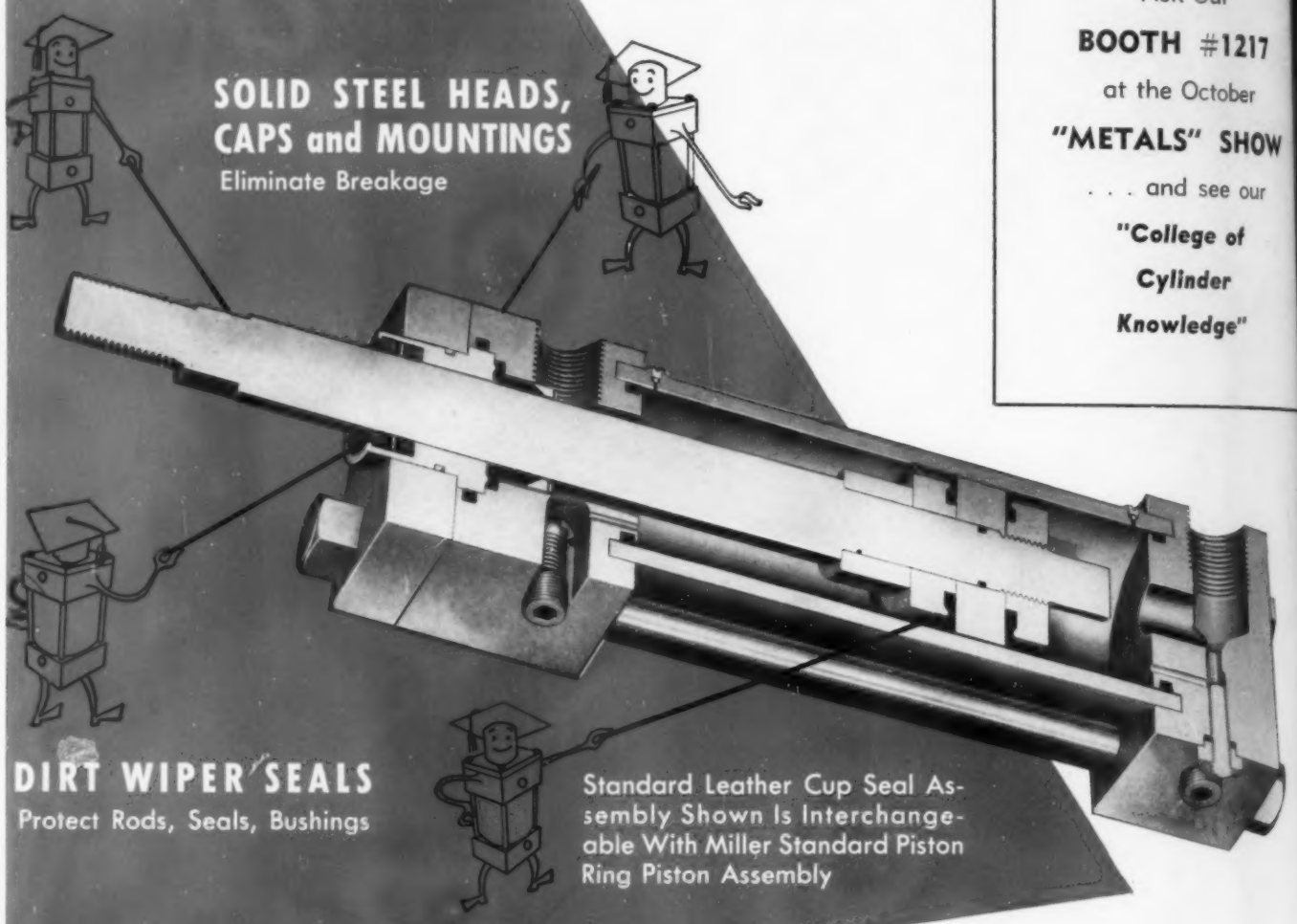
City_____ State_____

Miller

HIGH PRESSUR HYDRAULIC CYLINDER

HARD CHROME PLATED PISTON RODS
Prevent Scratch-Damage, Nicks and Rust

SOLID STEEL HEADS, CAPS and MOUNTINGS
Eliminate Breakage



DIRT WIPER SEALS
Protect Rods, Seals, Bushings

Standard Leather Cup Seal Assembly Shown Is Interchangeable With Miller Standard Piston Ring Piston Assembly

Visit Our
BOOTH #1217
at the October
"METALS" SHOW
. . . and see our
"College of Cylinder Knowledge"



WRITE FOR CYLINDER BULLETINS H-104 and A-105

Complete Miller cylinder line includes: air cylinders, 1½" to 20" bores, 200 PSI operation; low pressure hydraulic cylinders, 1½" to 6" bores for 500 PSI operation, 8" to 14" bores for 250 PSI; high pressure hydraulic cylinders, 1½" to 12" bores, 2000-3000 PSI operation. All mounting styles available.

MET J. I. C. HYDRAULIC STANDARDS years before their adoption in 1949.

SPACE-SAVING SQUARE DESIGN originated by Miller in 1945.

SALES AND SERVICE FROM COAST TO COAST

CLEVELAND • YOUNGSTOWN • DAYTON • PITTSBURGH • PHILADELPHIA • BOSTON • HARTFORD • NEW YORK CITY • BUFFALO • ST. PAUL • GRAND RAPIDS • DETROIT • FLINT • FORT WAYNE • SOUTH BEND • INDIANAPOLIS • MILWAUKEE • LOUISVILLE • KANSAS CITY • SEATTLE • LOS ANGELES • SAN FRANCISCO • BALTIMORE • DENVER • ST. LOUIS • MOLINE • CHICAGO • HOUSTON • TORONTO, CANADA and OTHER AREAS

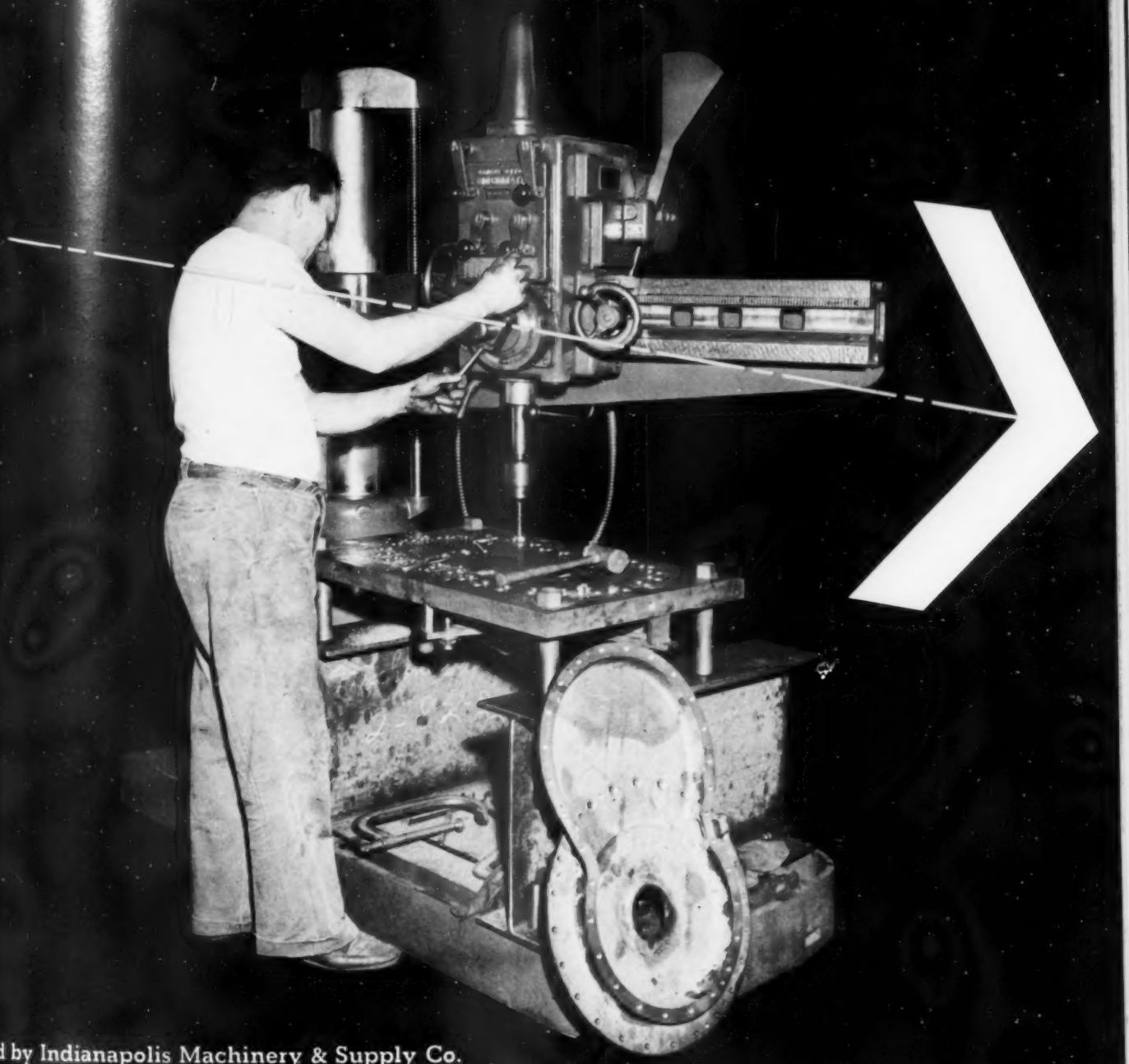
Miller

MILLER MOTOR COMPAN

2010 N. HAWTHORNE AVE., MELROSE PARK, ILL.

AIR & HYDRAULIC CYLINDERS • BOOSTERS • ACCUMULA
COUNTERBALANCE CYLINDERS

BALANCED PERFORMANCE



d by Indianapolis Machinery & Supply Co.

Drilling and tapping cast iron tank transmission parts at Dickey & Sons, Inc., Indianapolis, Indiana, one of the many job shops whose Cincinnati 3'7" Radials have "paid off" very quickly, as proven by careful record-keeping. This radial has a high "earning rate per square foot of floor space" because 1) it's inexpensive, and 2) a lot of work falls within its 1-inch capacity.
Your Cincinnati representative will gladly arrange a demonstration.

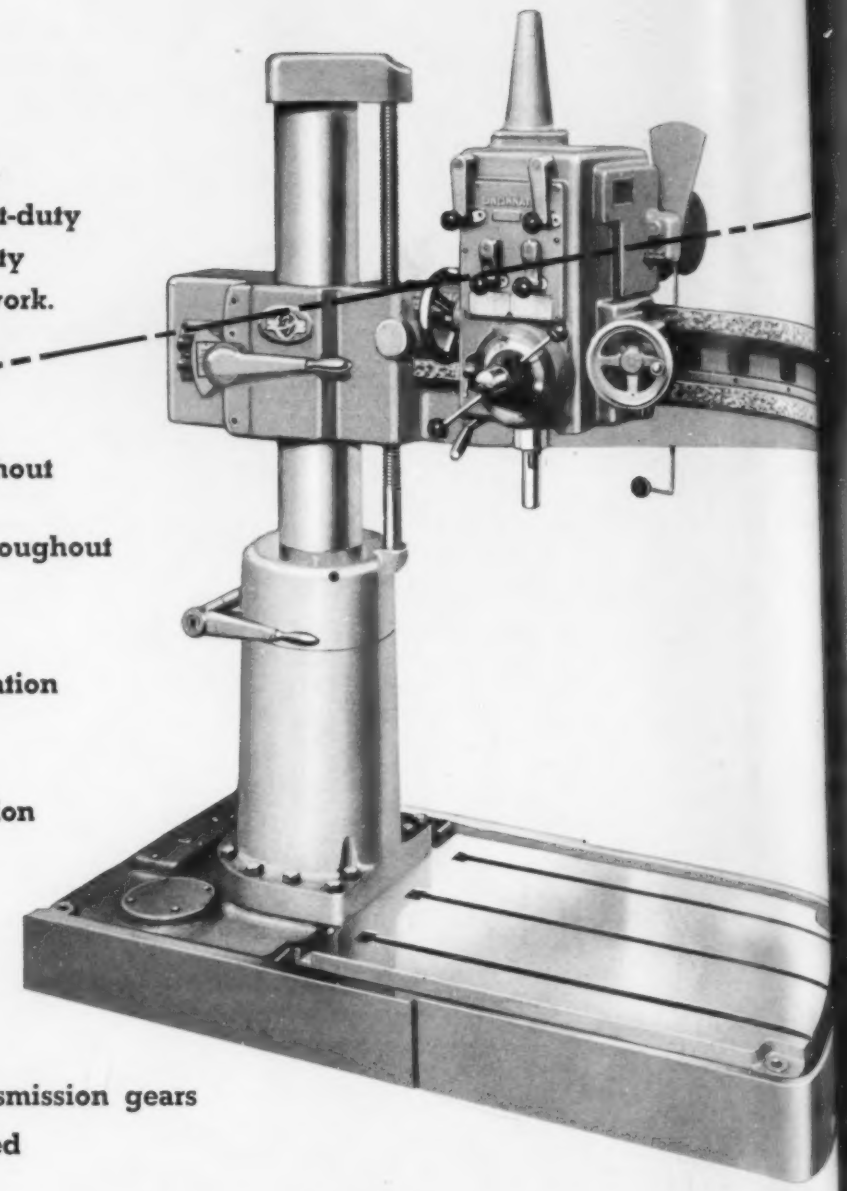
best buys in their class!

CINTIDRILL

CINCINNATI LATHE & TOOL CO., CINCINNATI 9, OHIO, U. S. A.

MORE WORK / DOLLAR

Cincinnati 3'7" radials are truly economy-priced light-duty machines whose 1" capacity handles a wide range of work.



Unit construction throughout

Anti-friction bearings throughout

All geared head
with automatic lubrication

9 spindle speeds
in geometric progression
30 to 1 overall ratio

6 power feeds

Simple direct drive

All speed and feed transmission gears
of alloy steel, hardened

This cost-saving radial is just one of the complete balanced line of Cintidrills, including 21" sliding head box and round column floor drills; 14" 3000 and 16" 3000 sliding head bench and floor drills; 16" and 18" Royal Cintidrills, bench and floor models, single and multiple spindles. Write for catalogs and name of your nearest dealer.

best buys in their class!

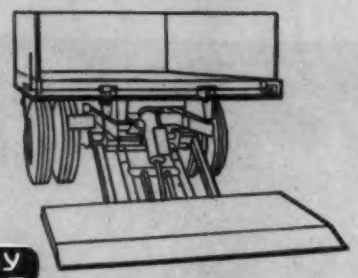


CINTIDRILL

CINCINNATI LATHE & TOOL CO., CINCINNATI 9, OHIO, U. S. A.



Checking the dies in a DANLY SPECIAL DIE SET—all steel, 4-post type, 26" x 35".



ANTHONY LIFT GATE HYDRAULIC

SHOWN IN LOADING POSITION



DANLY SPECIAL DIE SETS



View showing DANLY SPECIAL DIE SET during production run. Tail gate gussets are blanked and pierced in a single stage operation from 10 gage blue annealed sheet.

DANLY®

DIE SETS . . . STANDARD OR SPECIAL
DIEMAKERS SUPPLIES

help Anthony give industry a lift !

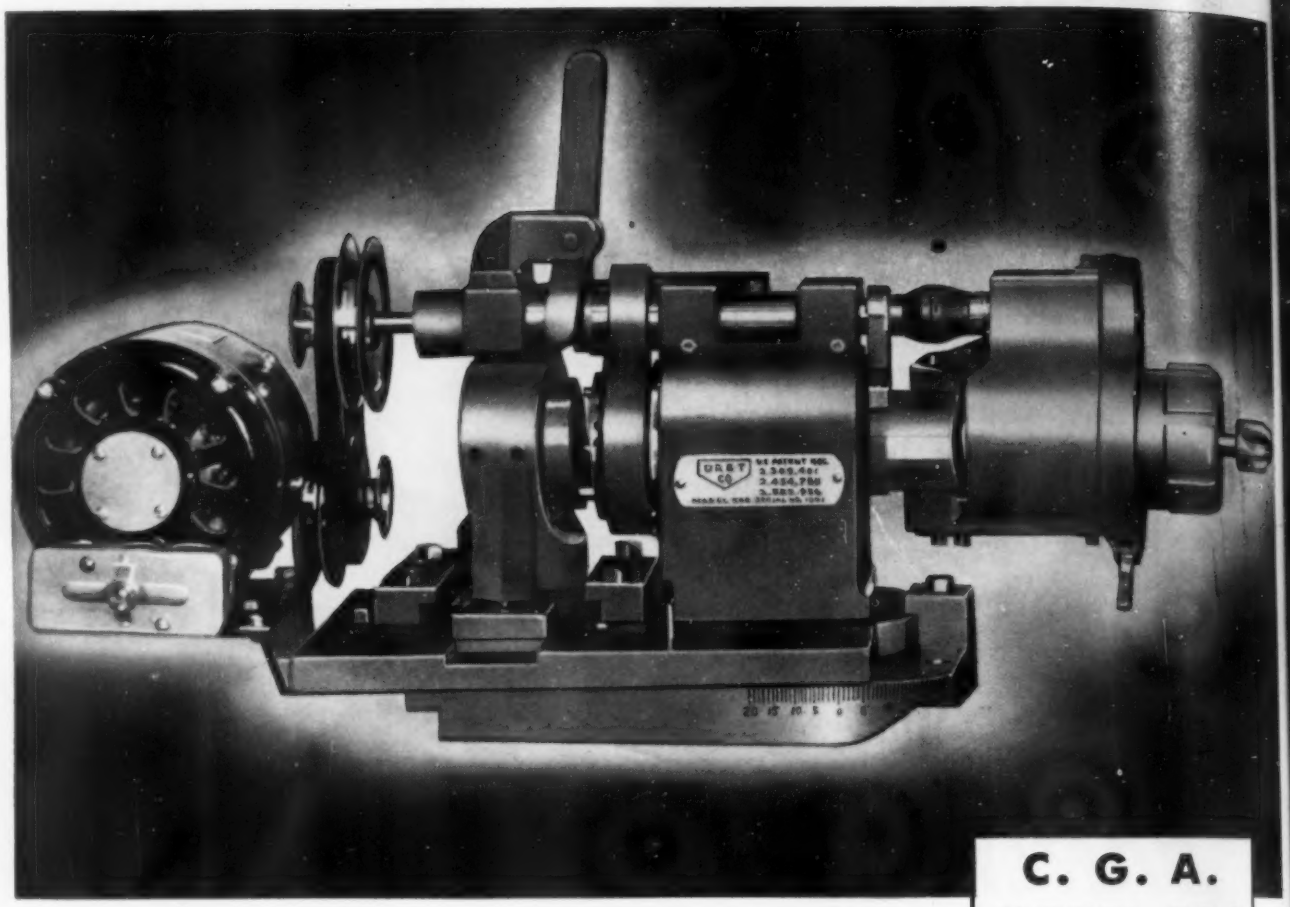
For years now, the Anthony Company, makers of hydraulic lift gates for motor trucks, has relied on Danly Special Die Sets in their production operation. Based on long experience, they've found that Danly Special Die Sets cut their tooling costs and save time . . . because they provide the finest precision starting point for diemaking. Why not build your production dies in Danly Special Die Sets? . . . see what die performance can really mean.

DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue, Chicago 50, Illinois

DANLY SPECIAL DIE SET SERVICE IS FAST AND CONVENIENT—CALL YOUR NEAREST DANLY BRANCH

***CHICAGO** 50	2100 South Laramie Avenue
***CLEVELAND** 14	1550 East 33rd Street
***DAYTON** 7	3196 Delphos Avenue
***DETROIT** 16	1549 Temple Avenue
***GRAND RAPIDS**	113 Michigan Street N.W.
INDIANAPOLIS 4	5 West 10th Street
***LONG ISLAND CITY** 1	47-28 37th Street
***LOS ANGELES** 54	Ducommun Metals & Supply Co., 4890 South Alameda
MILWAUKEE 2	111 East Wisconsin Avenue
***PHILADELPHIA** 40	511 W. Courtland Street
***ROCHESTER** 6	33 Rutter Street

*Indicates complete stock



C. G. A.
MODEL 500

New CIRCULARITY. . . . .
GRINDING ATTACHMENT

Detroit Reamer & Tool Company engineers, after months of intensive research and extensive development, have produced in the model 500 Circularity Grinding Attachment a new device that has many outstanding improvements. This new model is faster, easier to handle, has positive control, greater adaptability, rugged construction, and is engineered and precision built to provide the finest in precision work. Therefore, it will be of invaluable assistance to anyone whose tooling standards must meet modern production requirements.

Simple, speedy set-ups on this accurate attachment permit fast and easy grinding of form relief, radial relief, form and radial relief together, tapered cylindrical and straight cylindrical. Cutting tool to be produced or reworked is held in collet or between dead centers and revolves on its own axial center. Where full length of spiral cutting tools is to be ground for both form and radial relief, the Circularity Grinding Attachment travel is similar to an O.D. grinder, which insures fine finish, back taper and accurate size.

DETROIT REAMER & TOOL CO.

2830 E. SEVEN MILE ROAD • DETROIT 34, MICH.

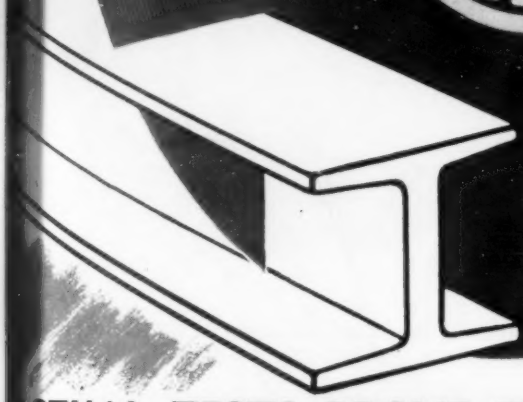
D R & T COMPANY

*Indicates complete stock

NEW! BAY STATE BZ SAF-T-CUT

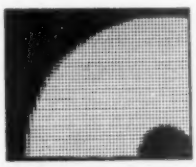
... A TRULY GREAT REINFORCED CUT-OFF WHEEL

REINFORCED CUT-OFF WHEEL
BZ SAF-T-CUT

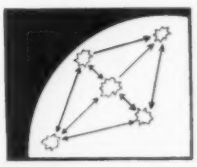


- GREATER SAFETY
- GREATER COOLNESS
- GREATER LIFE (10 TO 20%)
- GREATER STRENGTH (100%)
- GREATER CUTTING SPEED (UP 20%)
- GREATER RESISTANCE TO LOADING

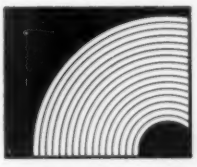
ACTUAL TESTS PROVE THAT BZ SAF-T-CUT WHEELS ARE... STRONGER... FASTER... COOLER



Reinforced with tough glass fiber for rugged STRENGTH and LONG LIFE.



New "BZ" Bond holds abrasive particles exactly right for OPTIMUM CUTTING POWER.



New Spiral Grooved sides give COOLER, CLEANER CUTTING on the 14" to 20" dia. sizes.



Micro photo shows "air-cooling" groove design that adds NON-BURNING feature.

BAY STATE ®

...le in Aluminum Oxide abrasive (for ... metals), and Silicon Carbide abrasive ...ting non-metallic materials).
...your BAY STATE REPRESENTATIVE for ... or write for size and specification data.

Development of the new "BZ" bond was aimed at improving safety, cutting rate, and wheel life for all cut-off work on steel bars, pipe, angle iron and other structural shapes, as well as ferrous and non-ferrous castings.

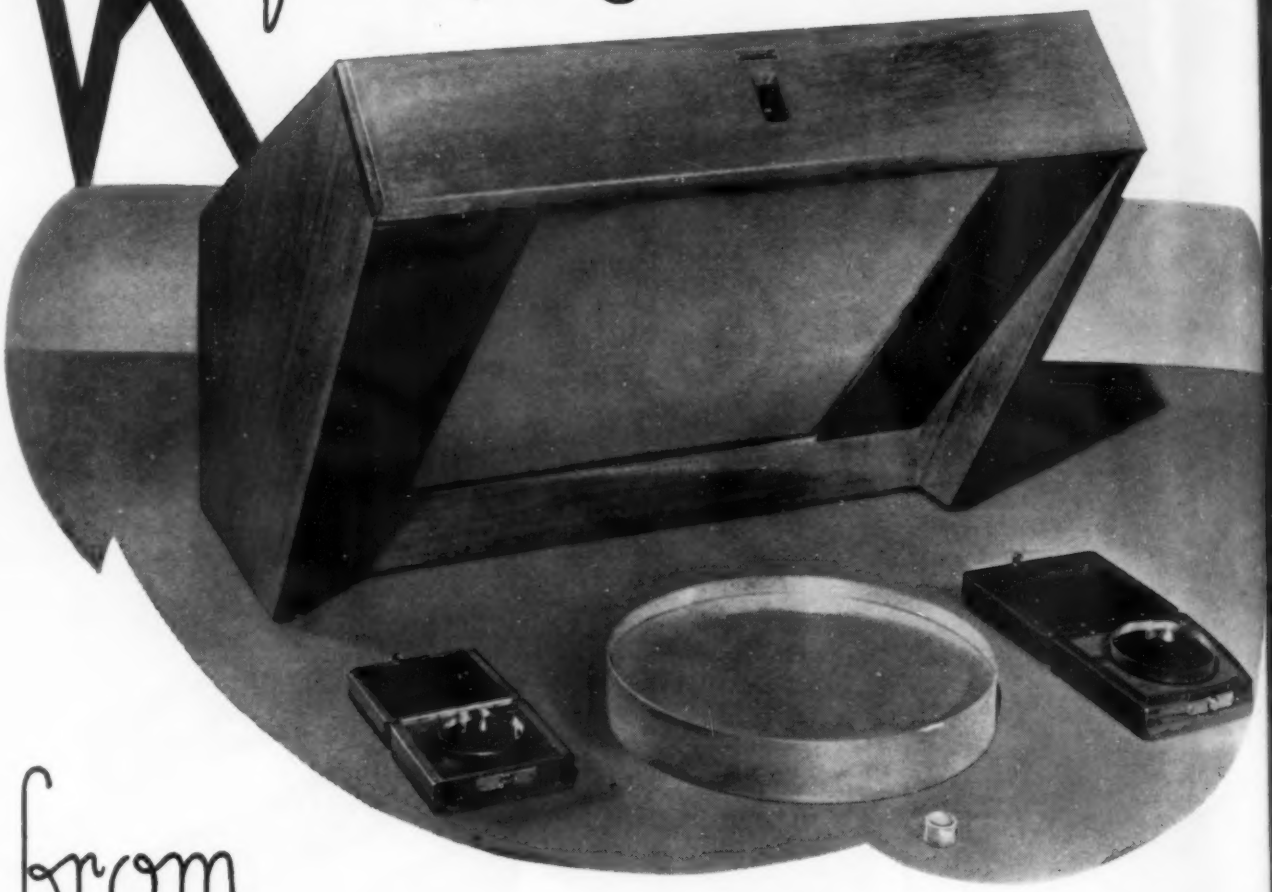
Actual tests show fast, clean cuts on these materials, plus performance records of 10 to 20% better life . . . and up to 20% faster cutting rate than the best competition.

BAY STATE says to its sales force and to you, "We believe this 'BZ' SAF-T-CUT wheel to be the best reinforced resinoid cut-off wheel on the market today, from every point of view". Ask for a demonstration.

BAY STATE ABRASIVE PRODUCTS CO., Westboro, Mass.

Branch Offices and Warehouses: Chicago, Cleveland, Detroit, Pittsburgh
Distributors — All Principal Cities
In Canada: Bay State Abrasive Products Co. (Canada) Ltd. Brantford, Ont.

VK fused quartz OPTICAL FLATS



from

½" diameter up . . . .
accurate to .000001"

With VK Optical Flats, close checking of flat surfaces is simplified and more conveniently handled.

Shown here is the new Van Keuren monochromatic light, 22¼" wide, 17¼" high and 20" deep (in bench space). It is designed for use with large optical flats such as the one shown—a 10" diameter fused quartz double-surface master flat (accurate to .000001" both sides).

VK Optical Flats are available in sizes from ½" diameter to 10" diameter in .000001", .000002" or .000004" accuracy. They can be shipped within 30 days from order.

Catalog and Handbook No. 35 is available by writing: The Van Keuren Co., 174 Waltham St., Watertown, Mass. Ask for your copy.

VK
34th YEAR

THE Van Keuren CO.,

174 WALTHAM STREET, WATERTOWN, MASS.

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Cemented Carbide Plug Gages • Carboloy Cemented Carbide Measuring Wires • Chrome Carbide Taper Insert Plug Gages



NOW
more sizes of...

Stainless Socket Cap and Set Screws

Available in stock from your Allen o Distributor

Demand for rust and corrosion resistant socket screws of high finish 18-8 stainless steel has been increasing steadily for ten years.

Allens have become the leading make because of the inherent advantages of Allen manufacturing methods, and because Allen Distributors carry the widest range of sizes as standard stock items – saving their customers time and money.

Now Allen widens its margin of leadership with still more distributor-stocked standard sizes in stainless:

97 Standard Sizes in Stainless Steel Socket Cap Screws

#4 x ¼" to ⅝" x 3" with NC threads
#10 x ⅜" to ⅜" x 1½" with NF threads

54 Standard Sizes in Stainless Steel Socket Set Screws

#4 x ⅛" to ½" x 1" with NC threads
#10 in lengths from 3/16" to ¾" with NF threads

ALLEN
MANUFACTURING COMPANY
Hartford 2, Connecticut, U.S.A.



NEW
Grip-head Stainless Steel cap screws for more convenient handling and easy, time-saving starting.

Sold only through leading industrial distributors


USING Fellows Origina
GEAR SHAPERS
SHAVING MACHINES
THREAD GENERATORS
CUTTERS AND SHAVING TOOLS
GEAR INSPECTION INSTRUMENTS
PLASTICS MOLDING MACHINES

Cutters . . .

CONTROL INSTRUMENT COMPANY KEEPS REJECTS "well under 1%"





Control Instrument Company of Brooklyn, New York, uses a Fellows 7-Type Gear Shaper to cut this 2.000" pitch diameter internal gear for a military fire-control device.

Using original Fellows cutters for both rough and finish cuts of this 4140 Chrome Moly steel, the number of rejects is exceedingly small. Control Instrument Company says, "... using Fellows cutters, our rejects are well under 1%."

The versatile Fellows 7-Type is the most widely used size in Fellows' complete line of Gear Shapers which generate gears from 1/16" to 120" diameter. It offers precision and high production on external gears up to 7" diameter, 1½" face and on internal gears up to 5½" diameter, 1" face. Set-up is simple, and changeover on production runs is quick.

For helpful information on cutting coarse or fine pitch gears, cams, ratchet teeth, interrupted profiles, segment gears, face gears, racks, and other unusual, high quality gears—just write, wire or 'phone the Fellows office nearest you.

ODUCTION DATA

Number of Teeth (Cutter) (Limited by projecting hub)	18
Number of Teeth (Gear)	96
Pitch	48
Pressure Angle	20°
Pitch Diameter	2.000 (+.002; −.000)
Run Out (Total Indicator Reading)	.001
Number of Cuts	2
Production Time (2 Cuts)	90 minutes
Blank Material	4140 Chrome Moly Steel

Fellows

THE FELLOWS GEAR SHAPER COMPANY • Head Office and Export Department • 78 River Street, Springfield, Vermont
Branch Offices: 323 Fisher Bldg., Detroit 2 • 5835 West North Avenue, Chicago 39 • 2206 Empire State Bldg., New York 1

Use our CYLINDRICAL GRINDING





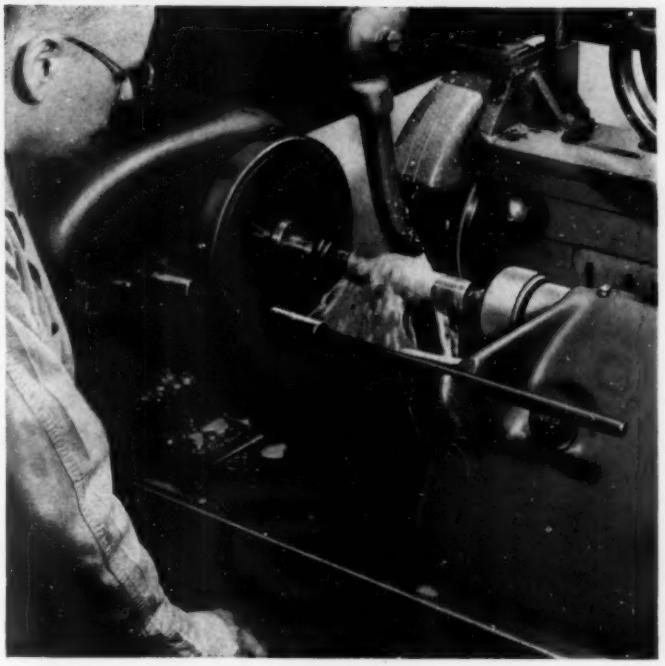
CARBO

REGISTERED

WHEELS on your job

...see *proof* that the right grinding wheel improves quality...boosts production...cuts costs

Make an *on-the-job* comparison of CARBORUNDUM's cylindrical grinding wheels with the wheels you're using now. Compare them for speed and accuracy of cut...for cool cutting action...long wheel life...economy. Find out what the *right* grinding wheel by CARBORUNDUM does for you—on your plain, universal, or special-purpose cylindrical grinder.



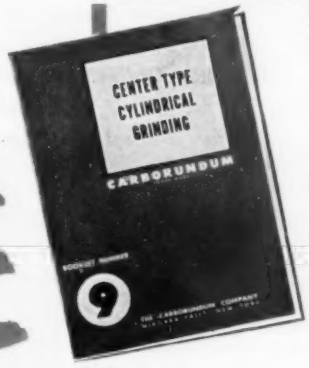
HOW TO CHOOSE THE RIGHT WHEEL

Your CARBORUNDUM Salesman or Distributor is the man to call. He'll visit your plant, analyze each part of your cylindrical grinding operation—your machines... the material you're grinding... your tolerance and finish requirements... the production rate you're after. Then he'll recommend the *right* combination of abrasive grain, grade, structure and bond—all engineered by CARBORUNDUM into a precision grinding wheel designed to give you the exact results you're looking for... the wheel which will give you highest output at lowest cost.

MAKE THE TEST TODAY—DECIDE FOR YOURSELF!

Call your CARBORUNDUM Distributor or Salesman. He's listed in the yellow pages under "Abrasives" or "Grinding Wheels." He's your best bet for experienced counsel ...and for prompt delivery from complete stocks...for every grinding job you do.

Get this helpful booklet FREE



THE CARBORUNDUM COMPANY, Dept. TE 81-321
Niagara Falls, New York

Please send me your booklet, "Center Type Cylindrical Grinding."

NAME _____ TITLE _____

STREET & NO. _____

CITY _____ ZONE _____ STATE _____

☐ Also send: Catalog No. 50—"Grinding Wheel Selector."
☐ New Simplified Basic Prices of Grinding Wheels.

RUNDUM

TRADE MARK

...the ONLY source for EVERY abrasive product you need

81-321



Levermatic
COLLET CHUCK

SPINDLE NOSE COLLET CHUCK

A New Standard For Positive Gripping. *Instant* internal and external gripping and releasing while machine is in constant operation, assuring continuous accuracy and uninterrupted production.

Faster... Lower Costs. Customers report big savings! One reveals his machine rates on production have been cut from 44½c to 22c per 100 pieces!

Used On Variety Of Machines. Lathes, Turret Lathes, Milling Machines, Grinders, Thread Grinders, Drill Presses, special production machines.

A PRODUCTION CHUCK FEATURING —

Highest Precision Accuracy
Full Spindle Capacity
Unequalled Gripping Power
No Heat or Friction
Full Bearing Collet
Simple Finger-Tip Adjustment
Economy and Labor Saving
Quicker Collet and Arbor Changes
Faster Chucking
Easy Mounting — Less Overhang

Expanding Arbor Broadens Use of Levermatic Chuck. Arbor is mounted in the chuck replacing the collet and collet nose for internal gripping. A complete range of expanding arbors is available for every job from 5/16" to 2½" dia. in the 1" capacity chuck, ¾" to 3⅝" dia. in the 1½" capacity chuck, and 1" to 4½" dia. in the 2" capacity chuck.

Fully Described in New Catalog
Shows Levermatic construction, specifications and many standard and special applications. Send For Copy Today!



RUNS AS TRUE AS THE SPINDLE

Sutton Tool Company

DEPT. TE10, STURGIS, MICHIGAN

New Thompson AUTOMATIC double wheel TRUFORM Grinder speeds jet engine production

GRINDS BOTH SIDES OF JET TURBINE BUCKETS OR BLADES SIMULTANEOUSLY IN A SINGLE SETTING

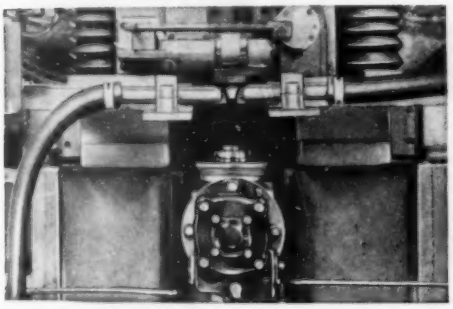


To grind root sections on gas turbine buckets with greatest accuracy and productivity, Thompson developed this new AUTOMATIC double wheel TRUFORMING machine featuring simultaneous grinding of both sides of root section with one setting of work.

Grinds rough to finish in 110 seconds . . . or 30 buckets per hour

Hood doors, work clamps, coolant flow, grinding and crushing cycles are actuated in automatic sequence on the new Thompson AUTOMATIC double wheel TRUFORM Grinder.

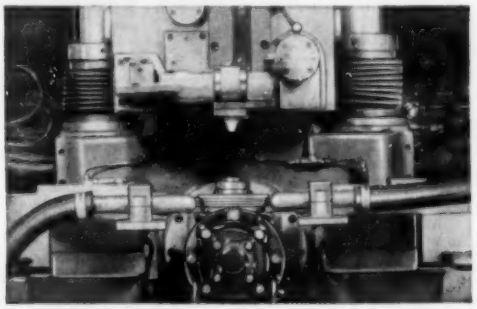
On a bucket having 2" length of form similar in design to the one in the diagram above with .150" stock removal per side from rough to finish size, production is 30 buckets per hour at a steady day after day rate. This includes down time for dressing, regrinding the crusher roll, initial machine warm up period, wheel changing and diamond changing. Actual machine time from rough forging or casting to finish is 104 seconds plus 6 seconds for loading and unloading time . . . makes total time floor to floor 110 seconds per piece.



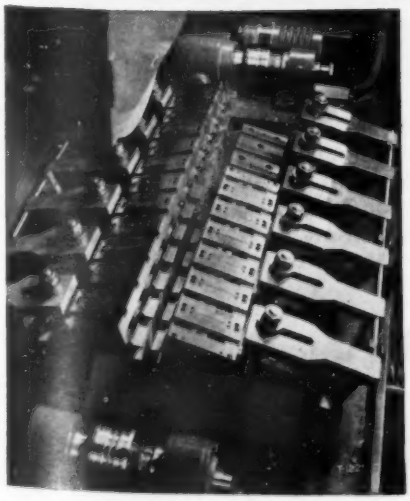
FOR ABSOLUTE SYMMETRY BOTH WHEELS ARE DRESSED FROM A SINGLE CRUSHER ROLL

◀ GRINDING POSITION

CRUSHING POSITION ▶

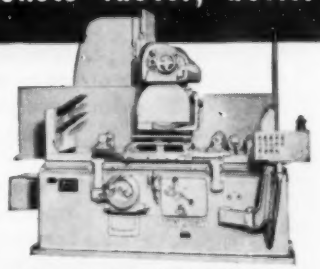


Standard THOMPSON TRUFORM Machines also grind jet buckets faster, better



By means of multiple grinding of jet turbine buckets the standard TRUFORM Grinders still offer high production plus many advantages such as flexibility of standard machine design and lower first cost. Although compared to the new AUTOMATIC the standard TRUFORM requires more skillful set up and tooling.

◀ **Typical tooling on Type "C" TRUFORM producing 24 buckets per hour. Type "B" TRUFORM produces 18 parts per hour.**



Thompson Type "C" TRUFORM

FOR COMPLETE DETAILS WRITE TODAY

The Thompson Grinder Co.
Springfield, Ohio

Thompson SURFACE Grinders



BRISTOL'S HEX SOCKET CAP SCREWS

help you get better design...faster production...easier maintenance!

Bristol Hex Socket Cap Screws give a new kind of socket screw performance. Used in products ranging from electric razors to massive machine tools, these modern fasteners have proved themselves with design, production and maintenance men everywhere. Here's why:

Made of special alloy steel, and specially treated to develop the proper hardness and strength, Bristol Hex Socket Cap Screws will give long service under the most severe conditions.

Bristol's Hex Socket Cap Screws set faster and easier, speeding up assembly on the production line. And they do away with protruding screw heads, giving smooth, flush surfaces for safety and streamlined appearance.

There's no delivery problem with Bristol's Hex Socket Cap Screws, either. Adequate stock is on hand to fill all orders without delay. In sizes ranging from No. 0 wire to 1 inch, all of Bristol's screws are precision-made to conform to Class 3 fit.

Write today for your free copy of Bristol's 40-page catalog on hex socket screws. A-3.4

BRISTOL'S SOCKET SCREWS



THE BRISTOL COMPANY, Socket Screw Division, Waterbury 20, Conn.

WALTON *SPECIALIZED* TOOLS



There's a reason 76%*

of all popularly-priced Tool and Cutter Grinders

DE VLIEG OF DETROIT

MAKERS OF

Fine Machine Tools

Brings you a new comprehensive Catalog featuring the latest range of Spiramatic Jigmil Precision Boring and Milling Machines . . .





Precision plus Production



A request on your company letterhead will bring a free copy of this catalog!

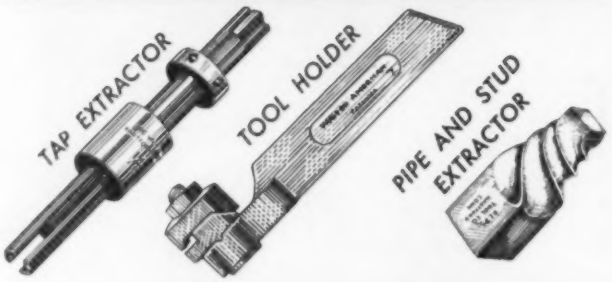
for the latest developments in precision boring equipment . . . consult

DE VLIEG OF DETROIT

DE VLIEG MACHINE COMPANY 450 Fair Avenue, Ferndale, Detroit 20, Michigan

No. 1 in a Series

WALTON SPECIALIZED TOOLS



CUT COSTS IN METAL WORKING

SAVE TIME
SAVE LABOR
KEEP PRODUCTION MOVING

Consider your costs of time, labor and lost production due to difficult removal of broken taps, screws, studs, and pipes. On many jobs these costs are the difference between profit and loss. Walton Specialized Tools will help you recover some of these losses.

Likewise, tool changes can build up excessive costs. The Walton-American Tool Holder is a cost reducer. Its adjustable, swivel head may be set for straight, right offset, or left offset positions. Many holders in one immediately at hand at the machine. No lost motions.

Write for the Walton Tools Catalog #36. It will tell you how to reduce your costs. Liberal free trial offer on all tools. Sold by leading industrial supply dealers.

THE WALTON COMPANY
HARTFORD 10 CONNECTICUT

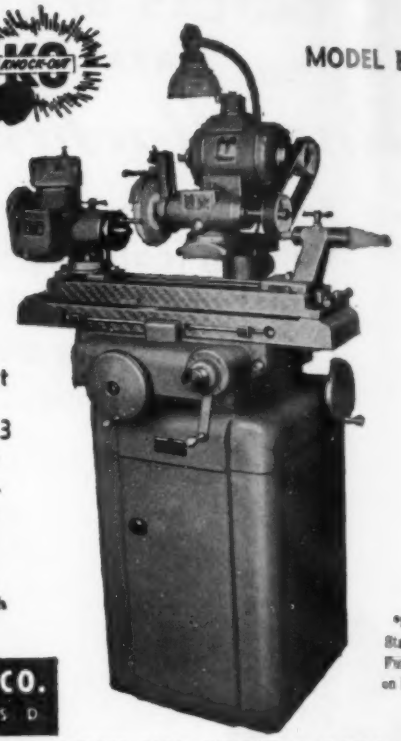
USE READER SERVICE CARD; INDICATE A-10-186-1

There's a reason 76%*

of all popularly-priced Tool and Cutter Grinders sold in 1952 were *"Knock-Outs"*



MODEL B860



Will do anything that machines costing 2 or 3 times more will do . . . yes and in less time.

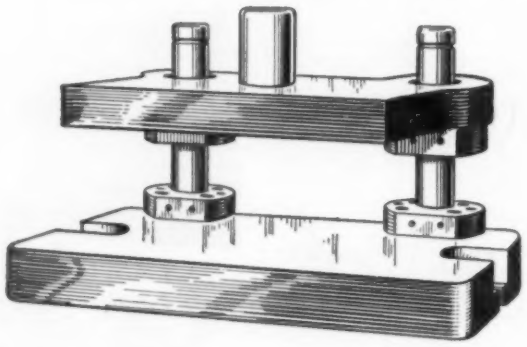
Distributed Only Through Franchise Dealers

K. O. LEE CO.
ABERDEEN S D

*Sales Statistics Furnished on Request

USE READER SERVICE CARD; INDICATE A-10-186-3

BAUMBACH DIE SETS GET THERE FASTER!



— SEE YOUR PHONE BOOK FOR LOCAL DISTRIBUTOR —

E. A. BAUMBACH MFG. CO.

1812 SOUTH KILBOURN AVENUE
CRawford 7-4041 CHICAGO 23, ILLINOIS

The OLDEST Die Set Manufacturer . . . The NEWEST Die Set Design

USE READER SERVICE CARD; INDICATE A-10-186-2

EFFICIENT—LOW COST PRODUCTION MEANS ROUSSELLE PUNCH PRESSES



O. B. I. PRESS HORN PRESS DEEP THROAT

WRITE FOR DETAILS

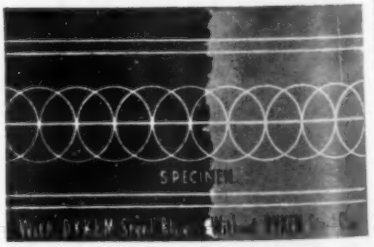
SERVICE MACHINE COMPANY
7627 S. Ashland Ave. • Chicago 20

USE READER SERVICE CARD; INDICATE A-10-186-4

DYKEM STEEL BLUE

STOPS LOSSES

making dies & templates



Simply brush on right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout show up in sharp relief and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information

THE DYKEM COMPANY, 2303D North 11th St., St. Louis 6, Mo.

USE READER SERVICE CARD; INDICATE A-10-186-5



No. 1 in a Series

"He who makes no mistakes does nothing"

In a supposedly modern era it is sometimes claimed to be "smart business" to let a competitor take the lead and make profit from his mistakes. Obviously, if all business adhered to such a philosophy there would be no progress, if any business. "He who makes no mistakes does nothing". Cone leadership was founded — and is maintained — by active service, by doing things.

The Conomatic Carbide Development program expects to make a few mistakes. But, loss or gain, its efforts will contribute to the general benefit of all "automatic" users, users on whom all "automatic" builders are dependent.

The job illustrated compares actual production runs with HSS and 100% carbide tooling. It suggests the kind of pioneering that is being done at Cone. Full details are available.



MATERIAL—1112 STEEL: Hole drilled with 1" dia. drill to 2¾" depth. OD threaded to 2" length with 1¼"—12 chasers.

	HSS	CARBIDE
Cycle Time	90 secs.	15 Secs.
Work Spindle Speed	370 R.P.M. at 103 S.F.	1500 R. P. M. at 417 S. F.
Tool Wear	1500 pcs. per grind	5000 pcs. per grind



Conomatic}

CONE AUTOMATIC MACHINE COMPANY, INC.
WINDSOR, VT., U.S.A.

Are you wasting dollars on over-finishing? Here is the problem



New Rotor B-35 Vertical Grinder with 6" cupwheel smooths a casting.



New Rotor B-35 Vertical Sander with 9" pad blends welds of machine base.

Speed up the job with these NEW ROTOR VERTICALS



YOU should try these new Rotor "power houses"! See how fast they remove metal. See how easy they are to handle . . . light in weight (only 10¾ lbs.) because of magnesium castings . . . comfortable balance because of adjustable handle angle.

Ask for a demonstration! Write for free copy of Catalog No. 40.



Are you wasting dollars on overfinishing? Here is the problem and a suggested solution from Brush Electronics Company...

How surface finish control can help you reduce your machining costs

By F. W. Witzke, Application Engineer, Brush Electronics Company, Cleveland, Ohio

PROPER surface finish control may well give you big savings in your plant by reducing production costs, increasing production rates and improving product performance.

Directly or indirectly, the factor of surface roughness affects almost every physical, mechanical and economic consideration of a machined part.

Overfinishing is costly

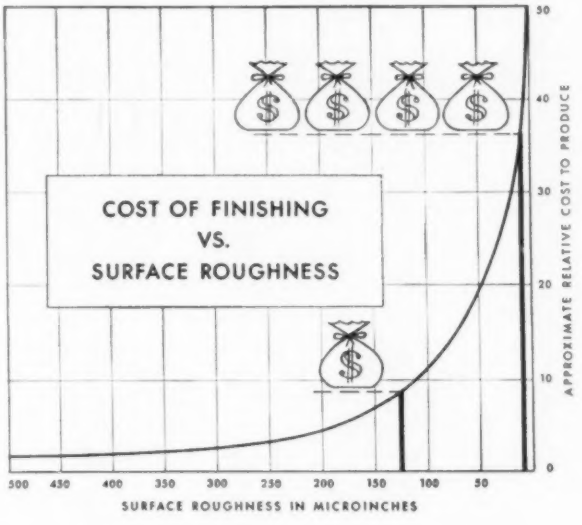
The chart at the right shows how finishing affects the cost of machined parts. For example, if the surface finish is specified as 125 microinches and you are overfinishing to 8 microinches because of lack of proper gaging equipment, your finishing costs can be four times as much as necessary.

To eliminate this costly overfinishing, actual checks of machined surfaces should be made in the shop to be sure that specified values are not exceeded. On mass production items, a reduction of a few cents per piece in machining may save thousands of dollars per year!

Surface finish control conserves machine capacity

By eliminating unnecessary operations you effectively increase plant capacity without additional investment. In this way surface finish control helps you increase production rates.

Periodic measurements of machined parts being processed also provide an excellent indication of when cutting tools should be replaced or dressed, because surface roughness increases rapidly with tool wear. Since many factors such as the tool, material, cutting speed, feed, etc., all affect the finish, proper information about finish helps you operate at optimum conditions, and higher speeds.



Improves product performance

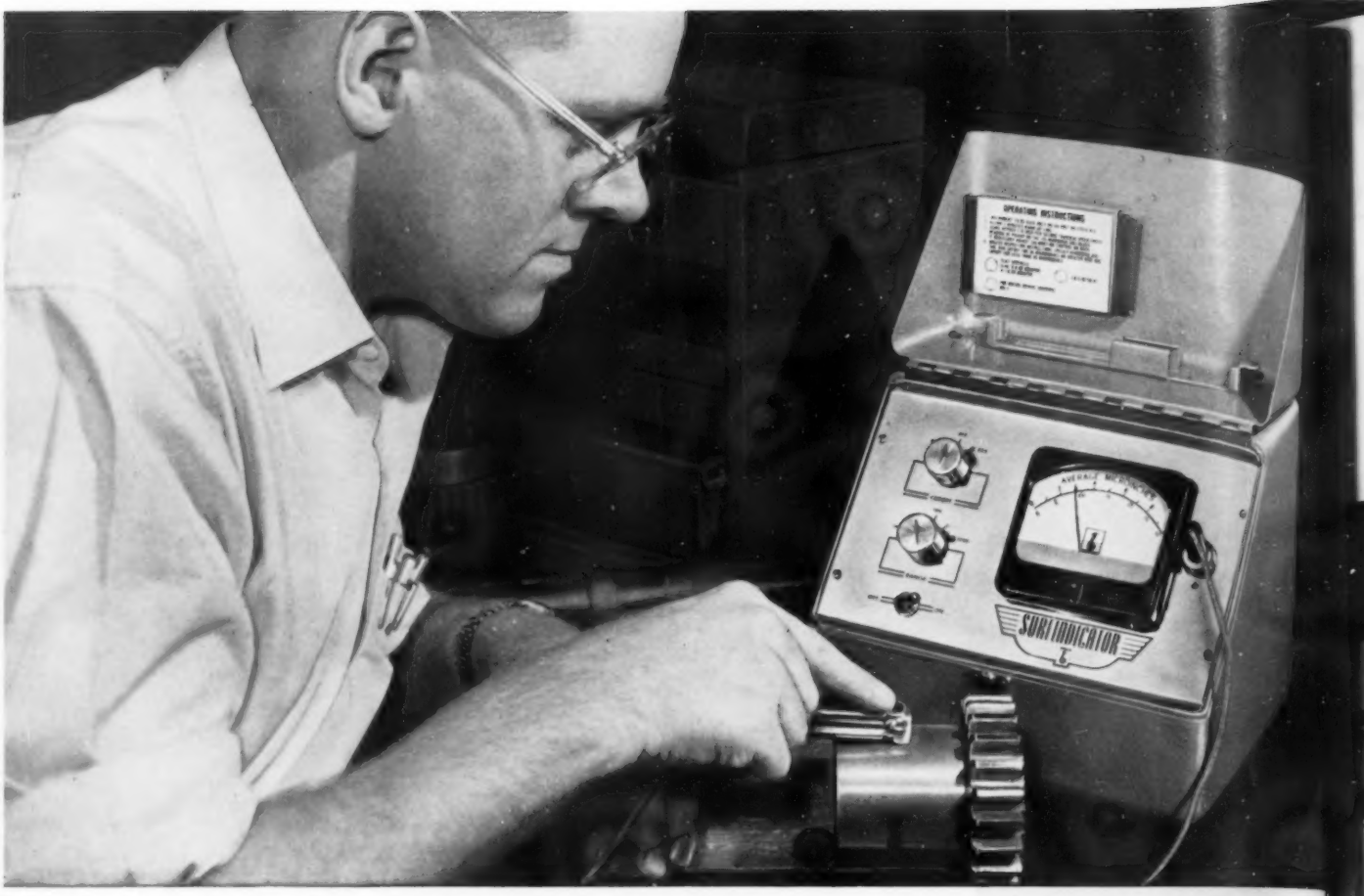
Proper surface finish control affects more than production cost. It can influence many factors in product performance, such as:

Break-in Time	Bearing Load	Adhesion
Wear	Reliability	Reflectivity
Noise	Heat Transfer	Leakage
Appearance	Friction	Galling
Corrosion	Lubrication	Safety
Dimensional Tolerance		Fluid Flow Resistance
Fatigue Strength		Tensile Strength

Fortunately, there is now a simple method of measuring surface roughness on the production line so that these important advantages can be realized.

Continued on next page

(Advertisement)



Brush Surfindicator*

...a practical shop tool for measuring surface roughness

The SURFINDICATOR meets the need for a shop instrument to measure surface roughness in production and inspection. This instrument, developed by General Motors Research Laboratories Division, and manufactured under patent license from General Motors Corporation, offers you the key to reduced machining costs, more efficient use of equipment, and improved products.

With this new, portable inspection tool you can make surface roughness measurements on the production line. The operator merely guides the pickup over the piece to be inspected, and then reads surface roughness in average microinches on the meter. This permits you to specify surface roughness in the design and then to measure it in the shop.

Using SURFINDICATORS, several plants in different locations can produce parts to the same surface roughness specifications. Here is the instrument that makes surface roughness measurement a practical shop operation.

Have you tried the SURFINDICATOR?

Visit us at Booth 1220 at the Metal Show and operate the SURFINDICATOR yourself. Or call your nearest Brush Electronics Representative for a demonstration.

BRUSH ELECTRONICS COMPANY, DEPT. BB-10
3405 Perkins Avenue, Cleveland 14, Ohio

BRUSH ELECTRONICS

☐ Please enter our order herewith for ..... Model BL-110 SURFINDICATORS, at $685.00 each, f.o.b., Cleveland.

☐ Please send booklet on the advantages of surface finish control.

Name_____

Company_____ Your position_____

Address_____

EASY-TO-USE... After brief instruction, shop personnel can make accurate measurements with the SURFINDICATOR.



PORTABLE... Weighs only 15 pounds and can be set up anywhere in the plant where 115 volts a.c. is available. Completely self-contained.



ACCURATE... Precision Reference Specimens permit calibration to an absolute standard, and enable you to check accuracy of instrument at any time.

Price of the SURFINDICATOR is only $685, f. o. b., Cleveland. It is completely self-contained, is ready to put to work.

*Trade Mark

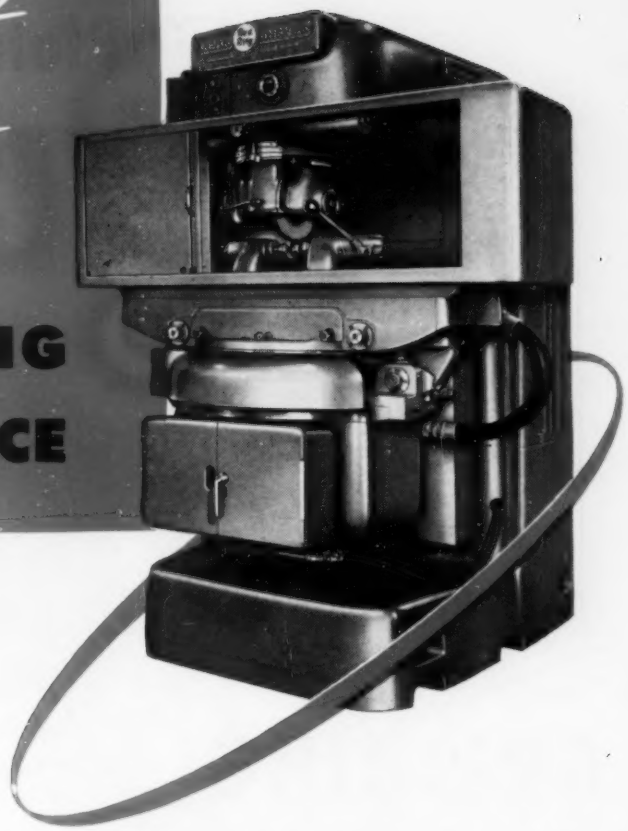
Fortuna Cylindrical Grinders

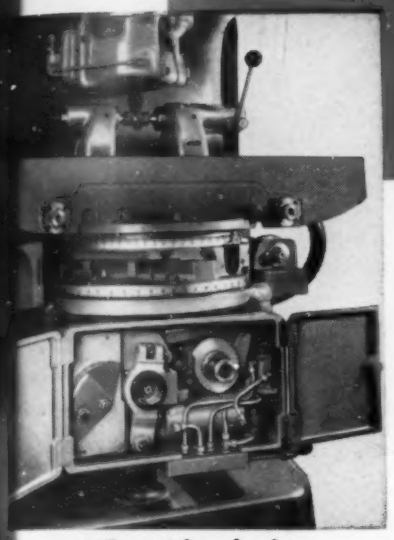
Continued on next page

(Advertisement)

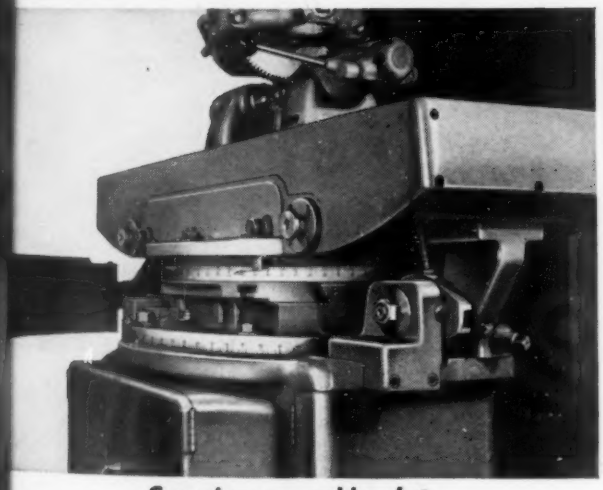
An Important Contribution

To GEAR SHAVING PRACTICE





Differential up-feed mechanism



Crowning cam and bracket

Two new features are now optionally available with the Red Ring Gear Shaving Machine Model GCU — Automatic Differential Up-feed and Conventional Crowning. So equipped, any of the recognized processes in the field of rotary gear shaving may be performed on this machine. It thus becomes economically applicable to both high production and to job shop operations and to gears of all characteristics within its size range.

Specifically the Model GCU with these additions can be used for:

(1) Diagonal shaving at fixed center distance on a two stroke cycle.
(2) Diagonal shaving on an automatic multi-stroke cycle with selected increments of up-feed and dwell.
(3) Conventional shaving on an automatic multi-stroke cycle with selected increments of up-feed and dwell.
(4) Precision gear crowning accomplished by rocking the table during any conventional shaving cycle.
(5) Taper shaving to specification.

Automatic cycling is precise and very fast. Production rates are high and cutter life has been increased to as much as 200%.

Write for Bulletin S53-7 which gives all the details of this important new development.

6501



NATIONAL BROACH & MACHINE CO.

5600 ST. JEAN . . . . . DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

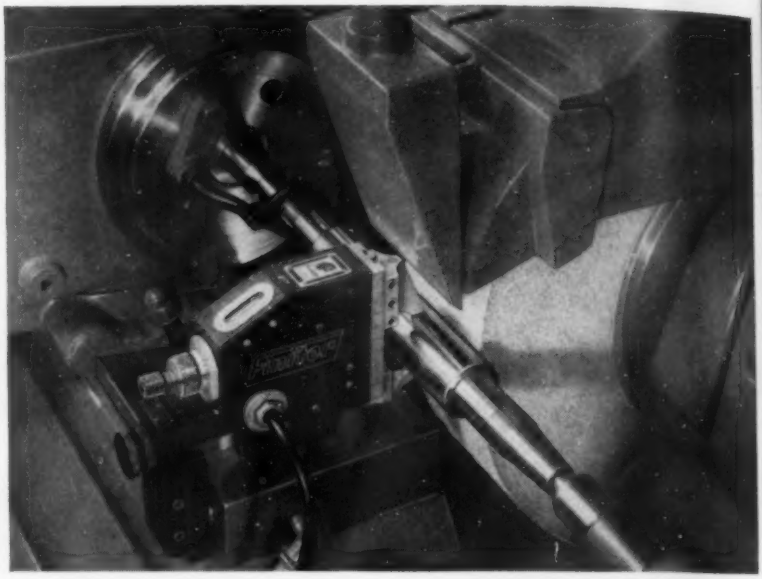
Fortuna Cylindrical Grinders

Plain and Universal Types

for

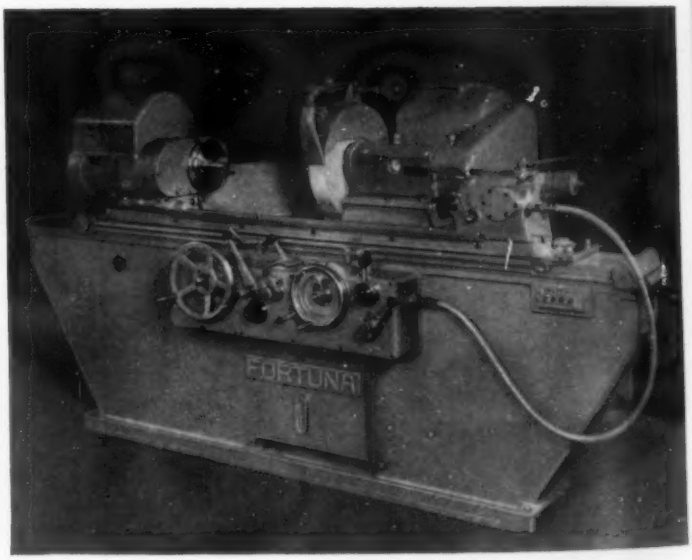
External
Internal
Form
Multi-Wheel
Profile

GRINDING



Finitor Automatic Sizing and Measuring Instrument, mounted on Fortuna Grinder, automatically controls grinding operations and holds size tolerances up to ± .00004".

Fortuna Grinders, for plunge cut or traverse grinding, are made in several types and sizes to accommodate workpieces up to 23½" diameter and 88" between centers . . . To increase production efficiency these hydraulically operated machines have single lever control for all operations of a pre-determined set-up . . . Numerous attachments are available to increase production and simplify grinding operations . . . For extremely accurate work, the grinders can be equipped with FINITOR Automatic Sizing and Measuring Instruments that automatically control the grinding operations and hold size tolerances up to ± .00004".



Type ES630 Fortuna Cylindrical Grinder

Send us the details of your grinding jobs. Cosa engineers will recommend the proper Fortuna Grinder. Or, write for Catalog.

COSA CORPORATION
405 Lexington Ave., New York 17

Your source for all Precision Machine Tools— from Small Bench Lathes to Large Boring Mills

IN DETROIT AREA contact DETROIT-COSA CORPORATION, 16923 James Couzens Highway, Detroit 35, Mich.



Cylinder gears—ground on a Reishauer ZA.

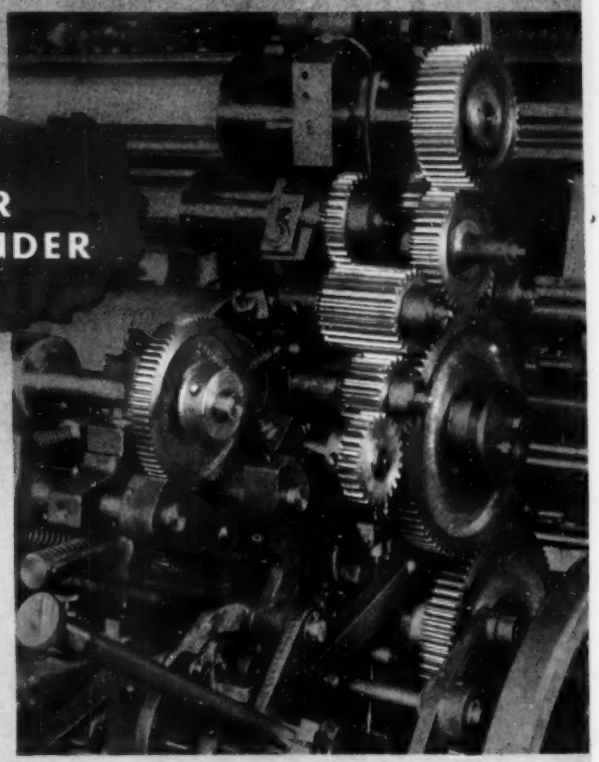
PRECISION GEARS...

the heart of fine printing presses...

are ground by AMERICAN TYPE FOUNDERS

on a

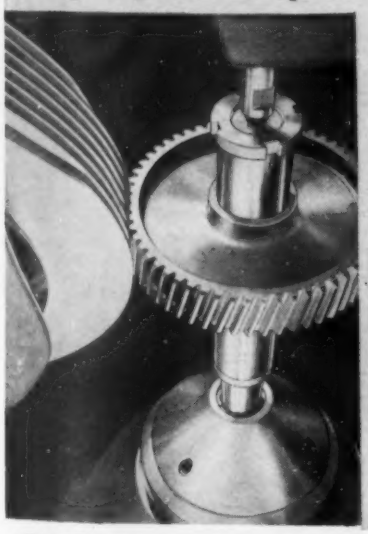
REISHAUER ZA GEAR GRINDER



Gear train on an ATF Press—ground on a Reishauer ZA.

Precision gears in a printing press are important, but cylinder gears on the ATF Chief are vital—they, in particular, must be accurately ground to prevent gear streaks on printed material, and they must be durable, to provide long-term accuracy. Therefore, ATF makes these gears from hardened alloy steel and precision-grinds them on the Reishauer ZA.

Heart of the Reishauer ZA—grinding wheel and spindle.



ATF is not alone in its respect for Reishauer's speed and accuracy—this machine is widely used to grind spur and helical gears in the automotive, aircraft, machine tool, gear-jobbing, and instrument industries.

Why is the Reishauer ZA so widely used? For one thing, it combines accurate grinding with production speed. For instance, floor-to-floor grinding time, on pre-hobbed gears, is about 8 to 13 seconds per inch-tooth.

There are many other reasons why the Reishauer ZA is the best production gear grinding machine you can get. If you want proof, we'll be happy to supply it. Get in touch with us soon, won't you?

COSA CORPORATION
405 Lexington Ave., New York 17

Your source for all Precision Machine Tools—from Small Bench Lathes to Large Boring Mills

IN DETROIT AREA contact DETROIT-COSA CORPORATION, 16923 James Couzens Highway, Detroit 35, Mich.

Industry reports pouring in prove...

"Positively giving us 2 to 3 times longer cutting life on tough Stellite alloy rough castings and forgings."

Toolroom Supervisor
Machinery Manufacturer

"We were getting 250 pieces per grind of our tool. Since installing the Fenlind machine with BEHR-MANNING belts, we have raised this to 1000 pieces per grind."

Plant Superintendent
Machinery Manufacturer

"Cutting 4340 material, we were getting one piece per tool. Now three pieces per tool with new Belt Method."

Tool Engineer
Aircraft and Automotive
Parts Mfg.

"On tools used for cutting through scale on rough castings, we have obtained five times the normal cutting life by finishing with BEHR-MANNING Belt Method."

Superintendent
Forge Works



Carbide tool life greatly extended

WITH BEHR-MANNING

ABRASIVE BELT SHARPENING METHOD!



Behr-Manning Micro-Finishing DURITE® Paper Belts with the Fenlind Micro Finisher not only give Carbide Tools a superior cutting edge, but also lower finishing costs by saving the expense of diamond wheels.

HERE'S THE COMBINATION THAT DOES IT

NORTON CRYSTOLON® WHEEL
39C60-18VK (Roughing Wheel)



FENLIND MICRO FINISHER
Model 13 (Pat. Pend.)



BEHR-MANNING SPEED-WET® DURITE®
Paper Carbide Tool Finishing Belts



● No unsupported claims or limited laboratory tests. Here are a few of many actual reports received from the severest and toughest possible "proving grounds" — the plants of American Industry! Since December, 1952, when this carbide tool finishing method was first introduced by Behr-Manning and the Fenlind Engineering Co., plant after plant has put this method to the test and "given it the works" in its toolroom.

The results have been spectacular. One large electric machinery manufacturer, after trying one Fenlind machine with Behr-Manning belts, now uses *thirty* in 9 different plants! An automotive manufacturer installed one Fenlind machine and followed up with an order for a dozen! In plants large and small the reaction is the same — the BEHR-MANNING® Belt Method gives carbide tools a superior edge.

If you haven't tried this new method you are missing a proven way to cut your toolroom costs. See for yourself. Check with your BEHR-MANNING Distributor or make a date with your local BEHR-MANNING Demonstration Room.

Behr-Manning Corp., Troy, N. Y., Dept. TE-10.

In Canada: Behr-Manning (Canada) Ltd., Brantford.
For Export: Norton Behr-Manning Overseas Inc., New Rochelle, N. Y., U. S. A.

BEHR-MANNING® CORPORATION
division of NORTON Company

▲ COATED ABRASIVES ▲ SHARPENING STONES ▲ PRESSURE-SENSITIVE TAPES

G-4

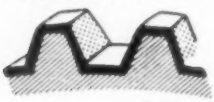
For the newest in coated abrasives...watch Behr-Manning!

The NEW

MODERN universal Burr-Master



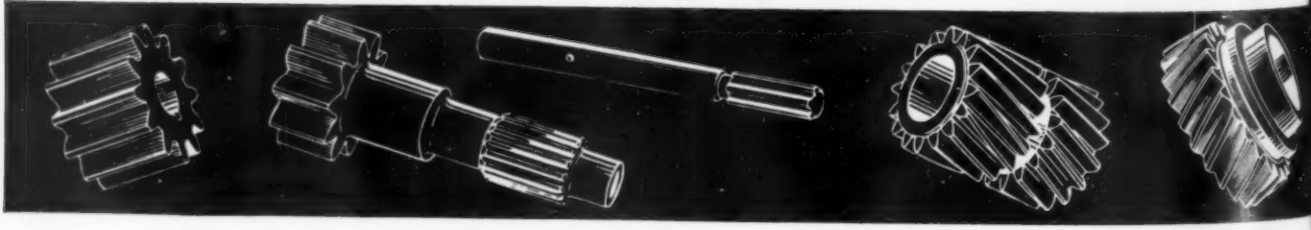
Model BME-14 Universal Burr-Master burrs and chamfers the complete tooth form on both sides and root as shown below.



The First Truly Universal Gear Burring and Chamfering Machine

At last, you can burr and chamfer the entire tooth form of both spur and helical gears from 5/8 to 9 1/2-inches pitch diameter, as well as external straight and involute form splines on the new Universal Burr-Master by Modern.

* Patents Pending



The new BME Universal Model Burr-Masters will solve your gear and spline deburring and chamfering problems at production rates heretofore impossible. Truly the answer to a normally costly gear and spline production operation, Modern's new Universal Burr-Master is . . .

universal . . because it doesn't sacrifice speed for versatility. Operating continuously, the machine deburrs and chamfers more than five teeth per second. A typical 22-tooth gear can be completely finished at a rate of more than 600 per hour, at 80% efficiency.

universal . . because new models have a capacity range from 5/8 to 6 1/2-inches pitch diameter and 3 to 9 1/2-inches pitch diameter for popular pitch gears. Both single and two-station models are offered for additional versatility.

universal . . because an unskilled operator can change the precision tooling for a different part in about 10 minutes setup time.

universal . . because it automatically compensates for minor stock variations in production parts. This unique design feature lets you deburr and chamfer gears or splines that are slightly oversize or out-of-round without affecting the operating cycle.

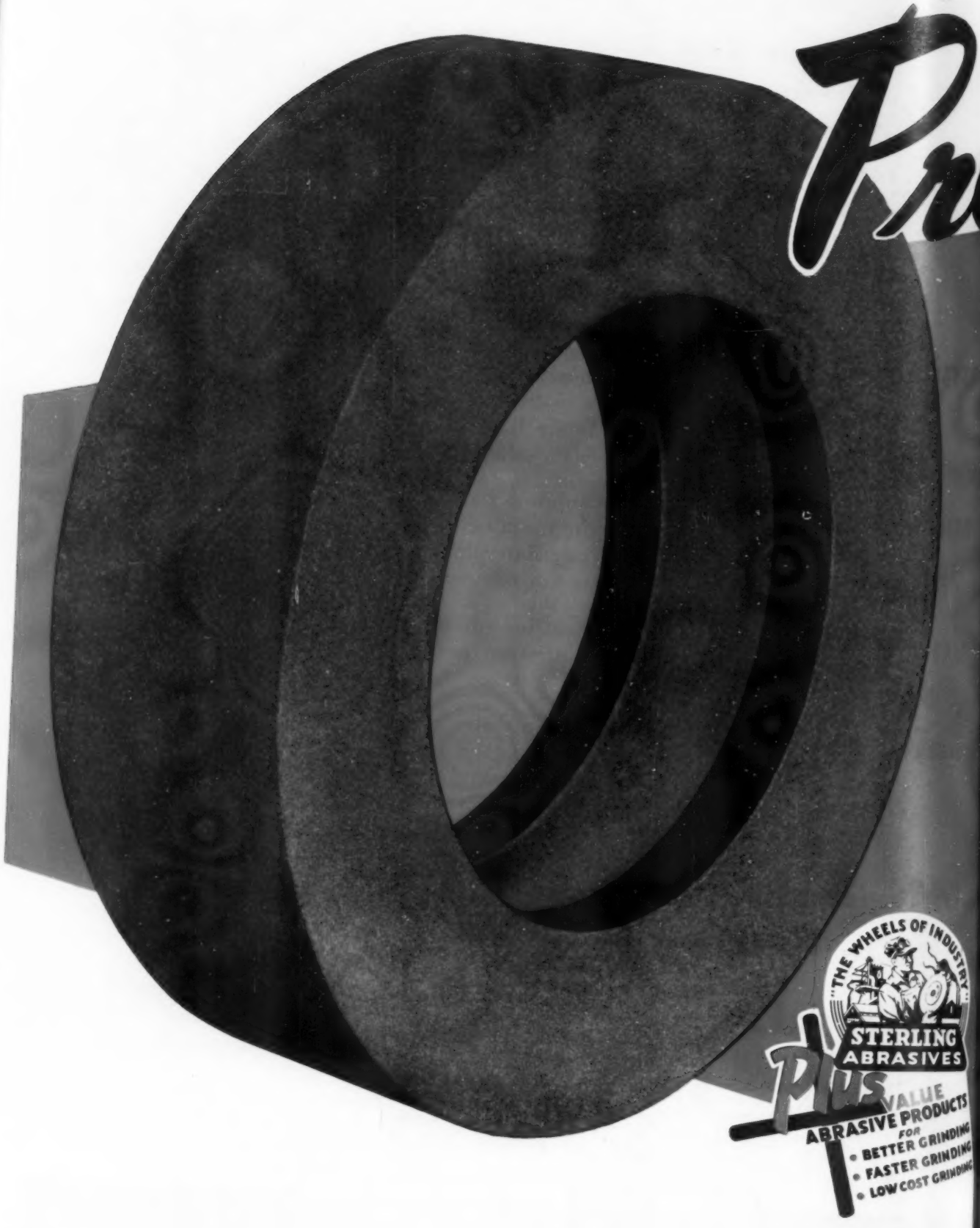
universal . . because all controls and adjustments are readily accessible when needed. No special tools required in making adjustments or changeover. All models developed for maximum production with minimum downtime.

universal . . because precision form-cutting tools can be removed, sharpened and replaced by an unskilled operator without worry as to gaging or alignment to retain correctness of form. Long tool life, too.

For complete details, write today for Bulletin 103-60

14230 BIRWOOD AVE. **MODERN** DETROIT 4, MICHIGAN

Industrial Engineering Co.



THE STERLING ABRASIVES

OF THE CLEVELAND

BRANCHES . CHICAGO — CLEVELAND — DETROIT

Tested . . .

By Constant Study on Thousands of Successful Centerless Jobs Plus Individual Concern For Your Particular Grinding Problems.

Sterling's Centerless Grinding Wheels have behind their years of successful operation the combined experience of our engineers on previous jobs. In addition, you have the proven abilities of Sterling laboratory technicians and abrasive engineers on your particular setup. All these important factors enter into the selection of the correct wheel specification that does your centerless job better, faster, more economically!

What is your grinding problem . . . elliptical parts, plunge cuts, magazine feed, slight tapers, thread grinding or a special setup? Do you need faster, more accurate production now? If so, Sterling's "Wheels of Industry" can provide everything you need for more efficient results on any troublesome job.

There need be no guess work about it! Results prove our promise of better grinding everytime. Specification duplication, ordinarily so difficult to obtain, is a fact when Sterling Centerless Grinding Wheels are used. That's where Sterling's Research and Development Program pays off!

Sterling engineers, skilled in all phases of centerless operation, are ready to prove how much greater production you can enjoy once these superior wheels are on your jobs. How about a test in your plant sometime this week? No obligation. A phone call or letter will bring a Sterling grinding expert in a hurry.



Send for these Folders.

As a supplement to the services of a Sterling engineer, these folders will prove a handy reference file for your daily use in determining the correct wheel to use for any grinding operation. Send for yours today!



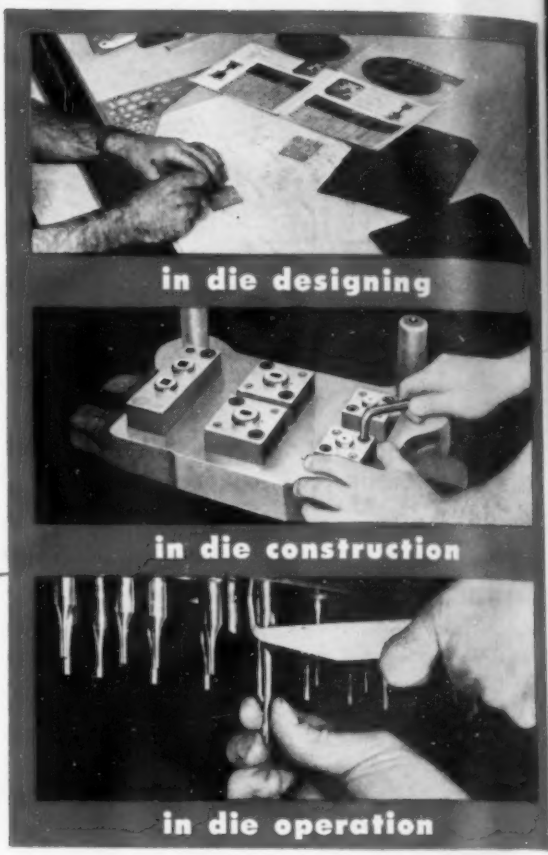
DIVISION · · TIFFIN, OHIO

QUARRIES COMPANY

DISTRIBUTORS IN ALL PRINCIPAL CITIES

WHERE R-B Punches cut your costs





IN DIE DESIGNING

. . . you save "board time" by working with the standardized R-B concept of punches, die buttons, punch retainers and die button retainers. R-B standardized equipment reduces drafting time to cut your costs.

IN DIE CONSTRUCTION

. . . you save "building time" because R-B punches, die buttons, punch retainers and die button retainers are furnished completely finished. R-B saves skilled die-maker's time to cut your costs.

IN DIE OPERATION

...you save "press time" because R-B punches and die buttons are instantly removed and replacements quickly inserted. Inherent accurate alignment and positive locking keep press down-time at a minimum to cut your costs.

Use R-B Engineering Service for Your Tough Piercing Problems.

RICHARD BROTHERS PUNCH DIVISION
ALLIED PRODUCTS CORPORATION
DEPT. 75 • 12667 BURT RD. • DETROIT 23, MICHIGAN



Please send me additional information.

NAME_____ TITLE_____

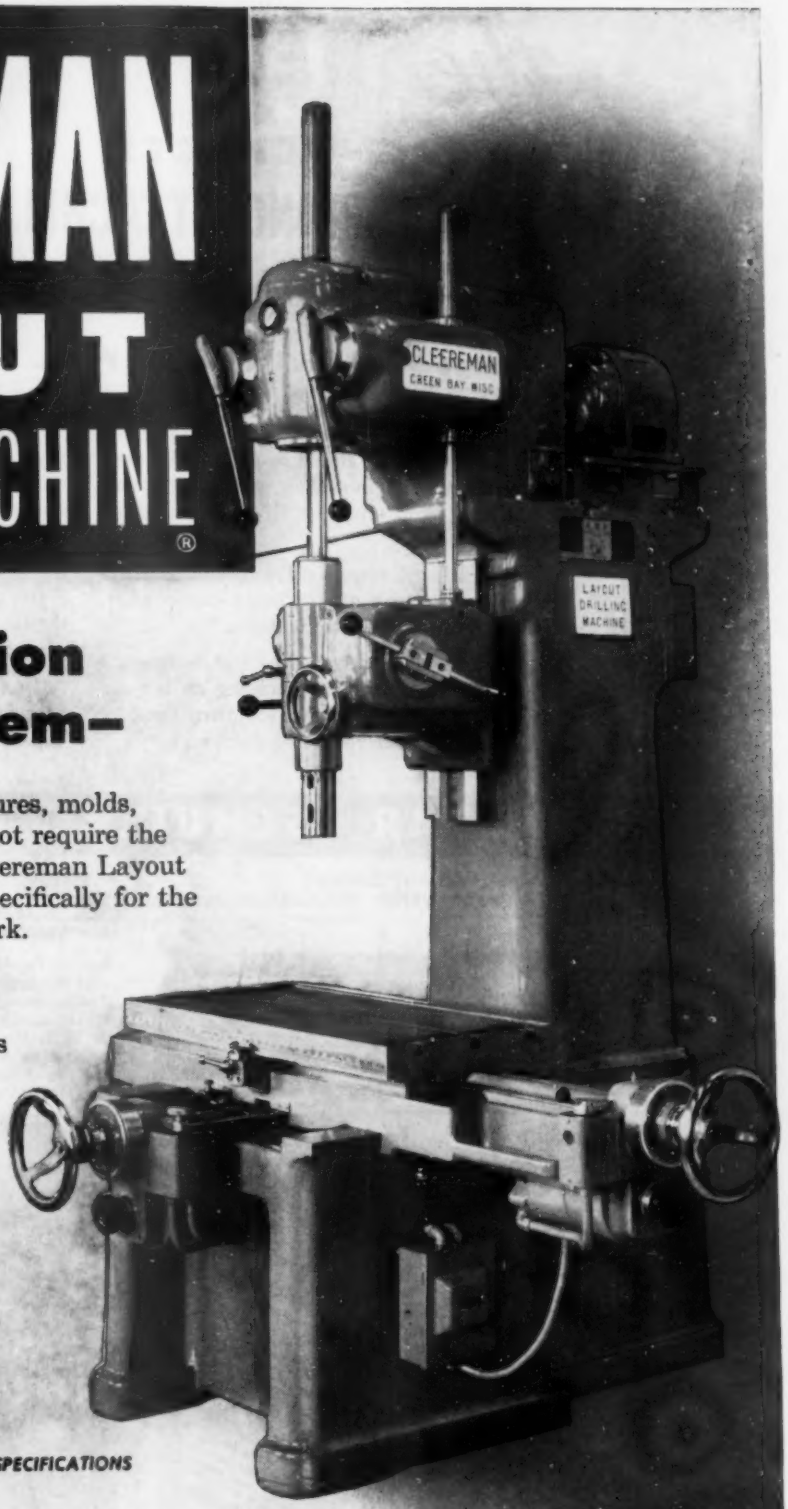
COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

Also Produced in
OTHER ALLIED PLANTS
SPECIAL COLD FORGED PARTS
STANDARD CAP SCREWS
PRECISION GROUND PARTS
SHEET METAL DIES
MADE OF FERROUS ALLOYS
ZINC ALLOYS OR PLASTICS

CLEEREMAN LAYOUT DRILLING MACHINE®



A Modern solution to an Old Problem–

A large portion of tools, dies, jigs, fixtures, molds, jig-less production and other jobs do not require the ultra-precision of a Jig Borer. The Cleereman Layout Drilling Machine has been designed specifically for the efficient handling of this particular work.

Built with many features of design similar to those used in Cleereman Jig Borers, the Layout Drilling Machine is an economical machine capable of accurately locating, drilling, boring, reaming, tapping, etc., with the utmost of operator ease, at a fast rate of production over a long period of time.

Cleereman standards of high quality and proven engineering design and material selection have been maintained in every detail.

WIRE OR WRITE *FOR CATALOG WITH COMPLETE SPECIFICATIONS*

ADDRESS...

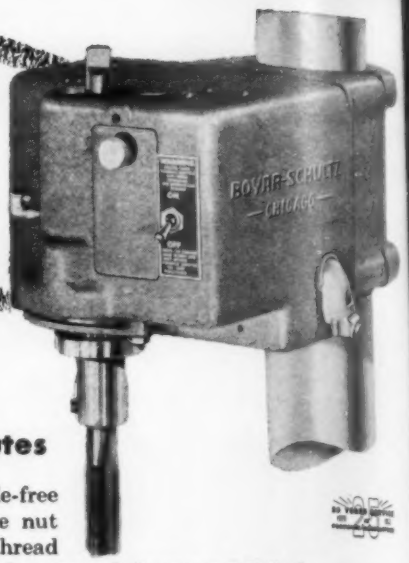
BRYANT
Machinery & Engineering Company
General Office
640 West Washington Blvd., Chicago 6
Representatives in Principal Cities

... Affiliated with ..

CLEEREMAN MACHINE TOOL CO. Green Bay, Wisconsin

BUILDERS OF PRECISION JIG BORERS AND DRILLING MACHINES

the NEW
BOYAR-SCHULTZ
LEAD SCREW TAPPING ATTACHMENT



Change Your Ordinary Drill Press
To a Precision Tapping Instrument in Minutes

Quickly and easily fitted to your drill press, it makes an efficient Tapping Attachment that can produce any thread including Class 4.

No special skill required for operation. Anyone familiar with a drill press can consistently produce accurate threads.

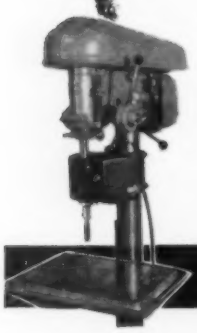
Foot control switch leaves hands free for loading work. Built-in reversing switch actuates drill press motor, eliminating need for any intermediate reversing device.

Long, trouble-free life of bronze nut and ground thread Lead Screw is assured, because of their generous 1¾" diameters.

Extreme accuracy in control of tapped hole depth is assured by electrically controlled reversing switches.

All taps up to ⅞" diameter usable with standard adapter bushings. Adapters for taps from 1⅛" to 2" available on special order.

Write for Descriptive Literature



BOYAR - SCHULTZ CORPORATION

2105 Walnut Street • Chicago 12, Illinois

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-202-1



Talide
(TUNGSTEN CARBIDE)

THE WORLD'S HARDEST METAL

1 Many times more durable than steel, it adds years of life to the wearing edges of tools, dies, machinery and equipment.

2 Hard as a diamond and almost indestructible, it triples output per man and per machine.

3 New heavy-metal alloy (17.5 specific gravity) has proven best for atomic radiation screening and for applications requiring maximum weight in minimum space.

Write for Catalog 52-G

METAL CARBIDES CORPORATION
YOUNGSTOWN 7, OHIO

USE READER SERVICE CARD; INDICATE A-10-202-2

No. S. O. 4612: 4-Way, 5-Station, Hydraulic Drilling, Counterboring and Milling Machine equipped with a 36" diameter Hydraulic Index Table on which is mounted five 2-position fixtures employing automatic clamping and unclamping. At Stations 2, 3, and 5 are Hydraulic Drill Units, each with 2-Spindle Drill Heads, while at Station 4 is a Hydraulic Way Type Unit with a 2-Spindle Milling Head. All units of the machine are electrically interlocked for control of cycle.

PART: Connecting Rod.
OPERATIONS: Drill and Counterbore Oil Holes and Mill Bearing Lockslots—2 Rods at a time.
PRODUCTION: 318 per hour at 80% efficiency.



Write for technical information.

STANDARD MACHINE AND TOOL CO., LTD.
WINDSOR, ONT.

U.S.A. Sales Representative
ARNOLD J. WERNER CO.
New Center Bldg.
Detroit 2, Michigan

USE READER SERVICE CARD; INDICATE A-10-202-3

JONES & LAMSON GUARANTEES



UNIVERSAL DRILL BUSHINGS

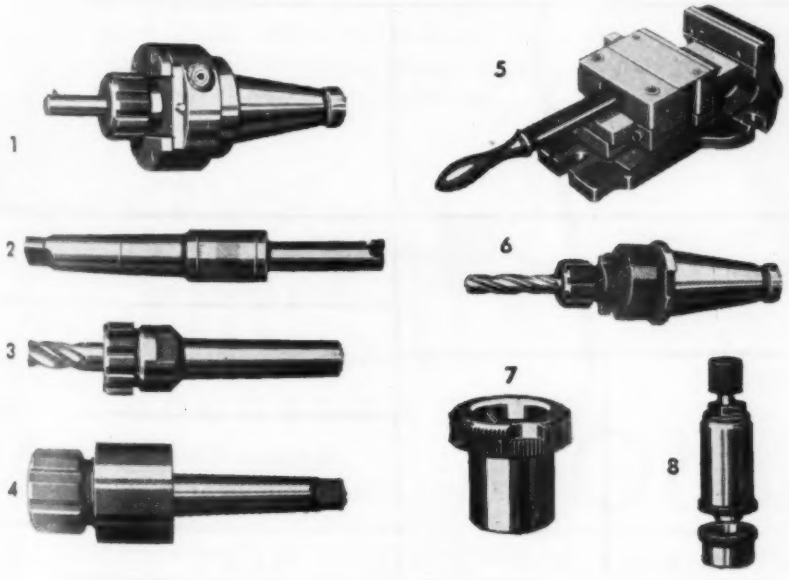
the production-tools' best friend

reduce tool wear
help prevent
tool breakage

prolong
tool life

Universal Bushings help keep tool costs down for several reasons: their superfinish bore helps reduce tool wear • their blended radius helps prevent tool hang-up and breakage • their 100% concentricity and hardness tests insure accuracy and uniform high quality • their knurled heads provide quick, sure grip • available in a complete range of standard diameters and lengths • orders for special dimensions will be handled promptly • For complete information, write to the office nearest you — Universal Engineering Sales Co., 1060 Broad St., Newark 2, N. J.; 5035 Sixth Avenue, Kenosha, Wis. — or the home office.

176



UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH 3
MICHIGAN

(1) BORING CHUCK
(2) MIKRO-LOK BORING BAR
(3) STANDARD COLLET CHUCK
(4) FLOATING COLLET CHUCK
(5) WEDGE-LOCK PRODUCTION VISE
(6) "KWIK-SWITCH" TOOL HOLDER
(7) STANDARD DRILL BUSHING
(8) UNIVERSAL INDEX PLUNGER

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-203

JONES & LAMSON GUARANTEES CLASS III THREADS with REPETITIVE ACCURACY!

J & L Automatic Opening Die Heads are sold with this guarantee: that your threads will be held consistently within the exacting Class III tolerances for form, lead and pitch diameter, throughout the long life of the J & L chasers.



FOR BROWN & SHARPE AUTOMATICS and SMALL TURRET LATHES
Capacities from #0 to 1¼"

RADIAL CHASER TYPE
Capacities from #8 to 4¼"

TANGENT CHASER TYPES
Stationary and Revolving. Capacities from #4 to 2"

Some of the reasons why:

COMPACT, RUGGED DESIGN GIVES MAXIMUM SUPPORT TO THE CHASERS. J & L Dies are made of solid steel, no built-up sections, hardened and precision ground throughout. Chasers are supported at the point of, and in the direction of, maximum strain.

THREAD FORM, HELIX, PRECISION POINT HEIGHT, ARE ALL GROUND INTO CHASERS AFTER HARDENING. This gives you a freer cutting tool, operating with minimum wear and repetitive Class III accuracy. The high precision of the J & L chasers is maintained in the Die by exclusive chaser holding features.

EASY, CONTROLLED RESHARPENING. J & L chasers are resharpened independently of the holders or dies. Instructions are simple, easy to follow. Eliminates guesswork. Exclusive holding features assure accurate resetting.

P.S. *Only J & L Die Heads and Chasers give you ALL these features. Write to Dept. 710 for illustrated catalogs and complete information.*

JONES & LAMSON

Machine Tool Craftsmen Since 1835

JONES & LAMSON MACHINE CO., 518 Clinton St., Dept. 710, Springfield, Vt., U.S.A. • DIE HEAD DIVISION

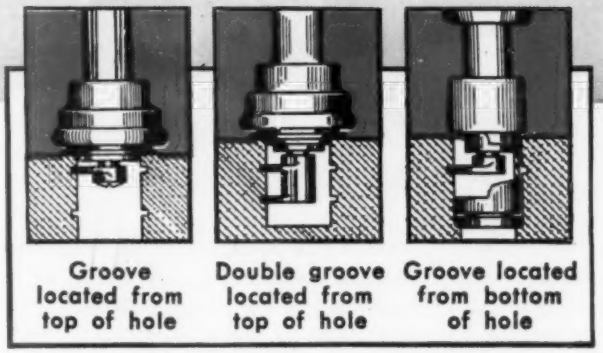


Waldes Truarc Internal Grooving Tool

for precision cutting of internal grooves in bores and housings

FAST! ECONOMICAL! NEEDS NO SKILLED LABOR!





Groove located from top of hole | Double groove located from top of hole | Groove located from bottom of hole

Internal groove-cutting becomes the simplest of operations with Waldes Truarc Internal Grooving Tool. Easy to adjust—easy to operate...readily adaptable to individual requirements.

Designed for use in any hand drill or automatic drill press and screw machine... assures a concentric recess without injury to metal. Operates by fingertip pressure—especially suitable for unskilled operators.

The Waldes Truarc Grooving Tool when used in an electric or pneumatic hand drill, can be taken to the job eliminating disassembly and excessive handling...resulting in all-around savings in time and costs!

Write now for new 12-page Catalog giving mechanical details, cutting sizes...extra features...full information

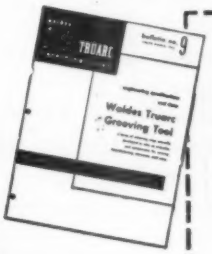


WALDES

TRUARC

REG. U.S PAT. OFF.

GROOVING TOOL



WALDES KOHINOOR, INC., 47-16 Austel Place, Long Island City 1, N.Y.
Waldes Truarc Grooving Tool
Manufactured under U. S. Pat. 2,411,426

Waldes Kohinoor, Inc., 47-16 Austel Place
Long Island City 1, New York TE105

Please send me your new 12-page Catalog on Waldes Truarc Internal Grooving Tool.

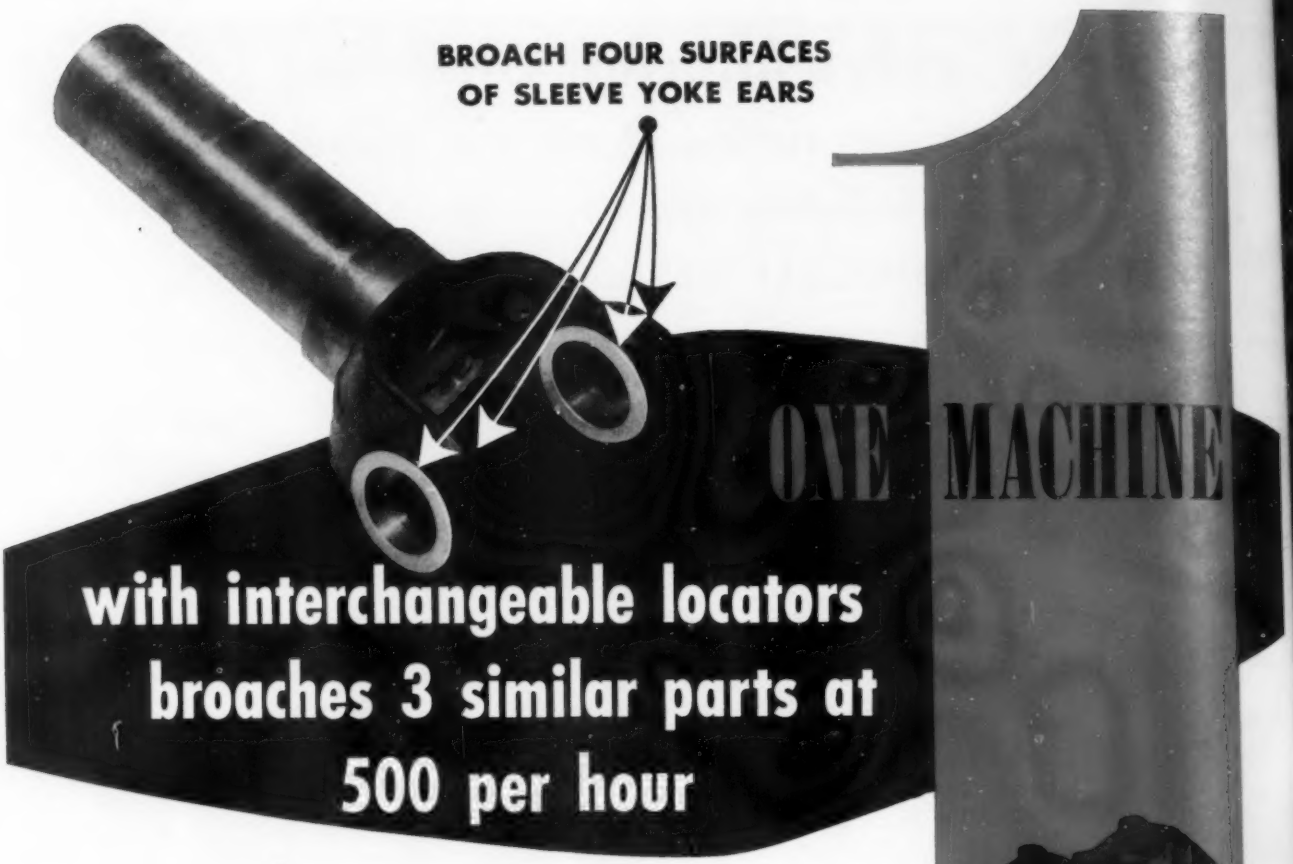
Name_____

Title_____

Company_____

Business Address_____

City_____ Zone____ State_____



ONE MACHINE

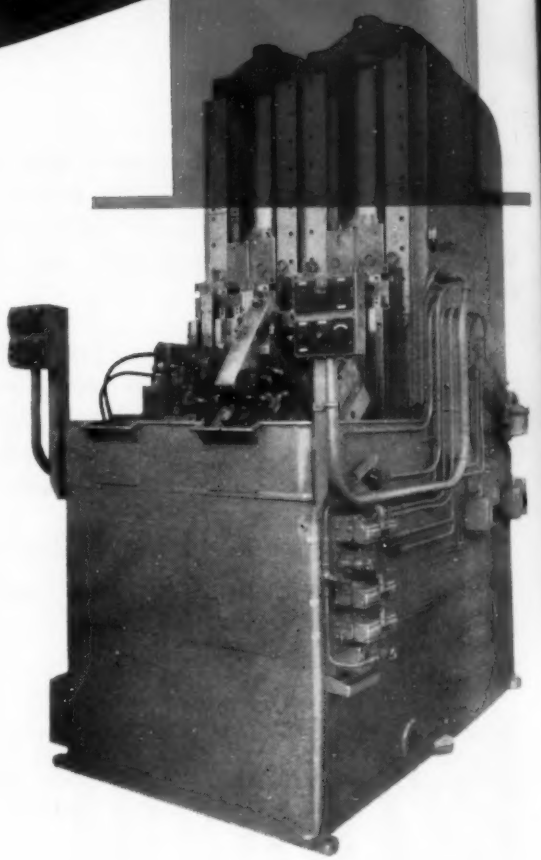
with interchangeable locators broaches 3 similar parts at 500 per hour

THE *American* WAY

Two, two-station base fixtures, mounted on tilting work tables, and arranged with automatic clamping, permit finish broaching the outside and inside faces of the ears on the sleeve yoke parts illustrated . . . at the rate of 500 parts per hour. Interchangeable locators makes it possible to broach any one of three similar parts on this American SBD-48-25 dual ram suface broaching machine.

The savings in time and the resulting low cost per unit are obvious. Such results, however, are typical when American engineers apply the knowledge and experience accumulated during the past 27 years to the practical solution of broaching problems.

Write, sending sample part or detail drawing and mention your hourly requirements. Our Engineering Department will be glad to furnish recommendations for the right machine and the proper tooling. And remember, American manufactures all three . . . broaches, machines and fixtures to give you a properly engineered, balanced solution to your metal removing problems.



AMERICAN

American BROACH & MACHINE CO.

A DIVISION OF SUNDSTRAND MACHINE TOOL CO.

SUNDSTRAND

American Building - Ann Arbor, Michigan

See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery



CLE◇FORGE *High Speed* DRILLS

Give More Holes Per Grind

On every job — no matter how difficult it may be — you'll appreciate the *extra* quality in these famous drills. They produce better work faster, at lower cost. No other drill gives you such outstanding *performance* and *economy.*

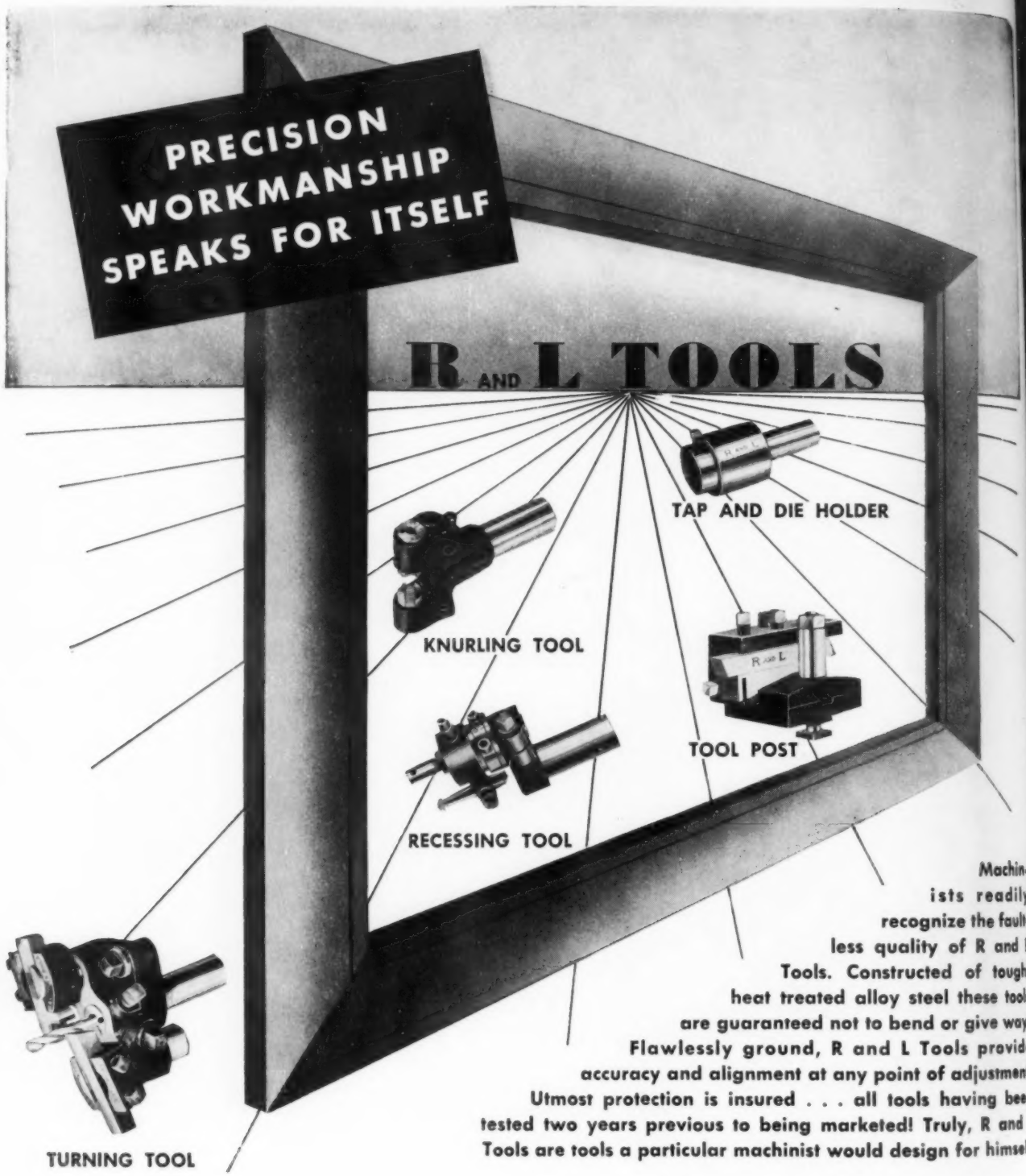
THE **CLEVELAND** TWIST DRILL CO.

1242 East 49th Street • Cleveland 14, Ohio

Stockrooms: New York 7 • Detroit 2 • Chicago 6 • Dallas 2 • San Francisco 5 • Los Angeles 58

E. P. Barrus, Ltd., London W. 3, England

TELEPHONE YOUR INDUSTRIAL SUPPLY DISTRIBUTOR



Machinists readily recognize the faultless quality of R and L Tools. Constructed of tough, heat treated alloy steel these tools are guaranteed not to bend or give way! Flawlessly ground, R and L Tools provide accuracy and alignment at any point of adjustment! Utmost protection is insured . . . all tools having been tested two years previous to being marketed! Truly, R and L Tools are tools a particular machinist would design for himself.

Write for complete catalog

RIGHT R and L LEFT **TOOLS**

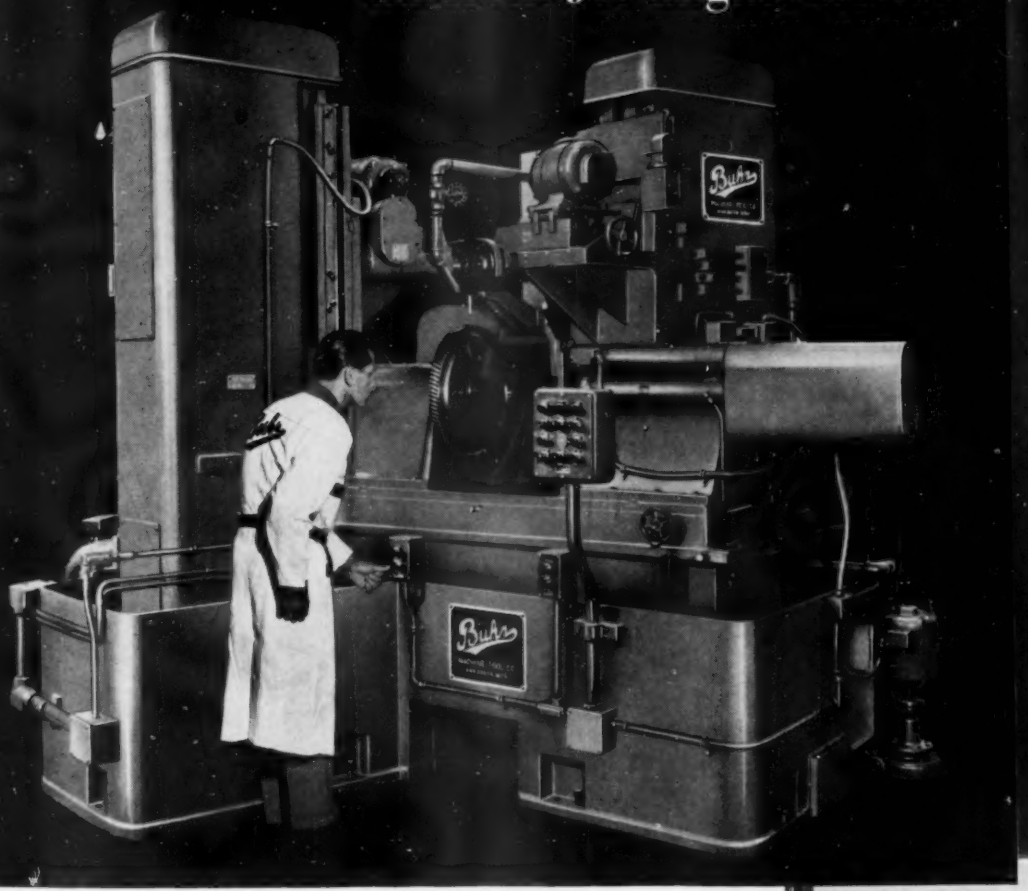
1825 BRISTOL STREET • PHILADELPHIA 40, PA.

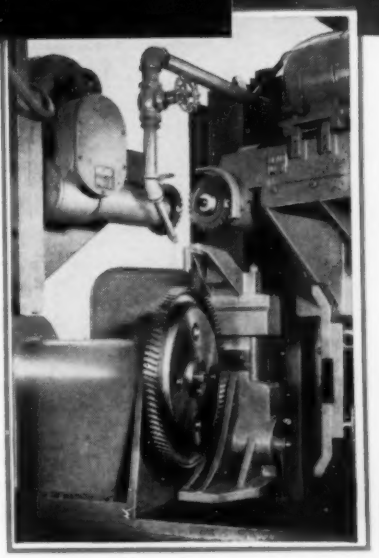
Manufacturers of Precision Screw Machine Tools

TURNING TOOL • TAP AND DIE HOLDER • UNIVERSAL TOOL POST • TURRET BACKREST HOLDER • CUT-OFF BLADE HOLDER • RECESSING TOOL
RELEASING ACORN DIE HOLDER • REVOLVING STOCK STOP • FLOATING DRILL HOLDER • KNURLING TOOL • CARBIDE AND ROLLER BACKRESTS

Buhr SPECIAL...

Mills both ends of 57 up to 103 slots in 16 different Jet Engine Rotors





Automatic 2-spindle milling machine, arranged with automatic index for milling both ends of dove-tailed slots.

Equipped with hardened and ground laminated tool-steel ways.

Hydraulic and electrical installations to J.I.C. standards.

Automatic index unit arranged for milling the various stages from 57 up to 103 slots.

Once machine is set up for any one part, operation is fully automatic, including stop when part is finished.

BUHR MACHINE TOOL CO.
ANN ARBOR, MICHIGAN

Buhr

MULTIPLE-SPINDLE HIGH PRODUCTION MACHINERY

PARKER • MAJESTIC PM PRECISION MACHINES



Pictured here is the home and products of

PARKER-MAJESTIC, INC.

For almost a quarter of a century this company has manufactured the **Parker** Spindles used in Precision Grinding, Boring and Milling applications. Additional products include the well known line of **Parker-Majestic** Internal, External, No. 2 Surface and Rotary Surface Grinders.

Descriptive literature upon request.



PARKER-MAJESTIC, INC.

formerly MAJESTIC TOOL & MFG. CO.

147 JOS. CAMPAU • DETROIT 7, MICHIGAN

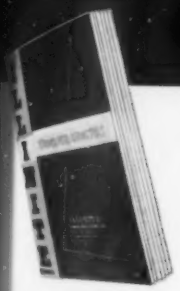


ILLINITE®

STANDARD CUTTING TOOLS

oduced by cutting tool experts to toolmakers' standards of precision and quality

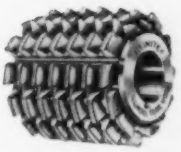




k Your Distributor for
TE Catalog 101 Today!

tool illustrated—complete
ional and purchasing data
zed for your convenience!

Here are precision metal cutting tools produced by master toolmakers, available through a nationwide system of stocked distributors. End mills, milling cutters, saws, keyslot cutters, shaper cutters, hobs and tool bits—all reflect the design features, precision workmanship and top quality materials that have made Illinois Tool Works "Headquarters" for metal cutting tools! Now, ILLINITE *Standard* Cutting Tools *from stock* assure convenient service, faster cutting, longer tool life.



ILLINOIS

TOOL WORKS

2501 North Keeler Avenue
Chicago 39, Illinois

STOCKED BY LEADING INDUSTRIAL DISTRIBUTORS

Look to MODERN for accurate,



WHEN
IT
COMES
TO
PRODUCTION . . .



AUTOMATIC DRILLING & TAPPING MACHINES

COME TO

HARTFORD
Special

THE HARTFORD SPECIAL MACHINERY CO. • HARTFORD 12, CONN.

Look to MODERN for accurate, fast, economical thread cutting

lened and ground throughout

der threading range

Made with least number of parts

Cut close-to-shoulder threads without special chasers



Easily adjusted for thread size

Greater flexibility

Quick and easy chaser change

MODERN
STATIONARY TYPE SELF-OPENING
DIE HEADS

Modern Precision Tools Include . . . . .

- STATIONARY SELF-OPENING DIE HEADS
- STATIONARY COLLAPSIBLE TAPS
- ROTARY COLLAPSIBLE TAPS
- MODERN-MAGIC CHUCKS AND COLLETS
- SELF-OPENING STUD SETTERS
- SOLID ADJUSTABLE DIE HEADS
- ADJUSTABLE HOLLOW MILLING TOOLS
- CHASER GRINDING FIXTURES

Modern Self-Opening Die Heads thread diameters from ⅛" to 7" in standard heads, and up to 14" in special heads . . . accurately, fast, and economically. They are adapted to practically every thread cutting operation within their capacity. Designed for use in hand screw machines, turret lathes, and other machines where the die heads are used in a stationary position.

For complete information, write for Bulletin No. M-124

MODERN TOOL WORKS
DIVISION
CONSOLIDATED MACHINE TOOL CORPORATION
SUBSIDIARY OF FARREL-BIRMINGHAM COMPANY, INCORPORATED
ROCHESTER, NEW YORK

Only ONE can be called the Finest:



. . . here's another good reason why:

CARLTON'S LOW HUNG DRIVE

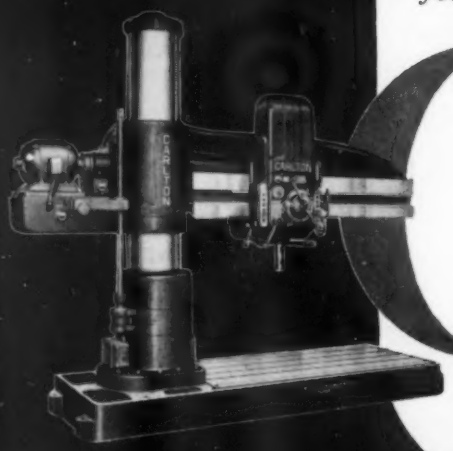
BRINGS THE HEAD *and* SPINDLE down to the work . . . not just the spindle.

Spindle accuracy and rigidity are assured *because the spindle is always close to the radial arm support.* This design eliminates spindle twist, which is one cause of vibration, thus reducing manufacturing costs by increasing tool life.

The main drive gear is placed in the *lowest part of the head.* It drives on the *largest diameter* of the spindle, *closest to the cutting tool* . . . a principle well established by its wide use in planers, lathes and milling machines. This permits the greatest amount of torque transmission.

Carlton's low hung drive . . . plus *all-ball-bearing construction, centralized pushbutton control, modern lubrication, 3-unit power clamping of arm, head and column,* and Carlton's many other advantages . . . means increased 'hole' production for you.

Write today for bulletins describing the Carlton Radial Drills you need. The Carlton Machine Tool Co., Cincinnati 25, Ohio.



Carlton radial drills



at a lower piece cost with

SPIRAL

special cutting tools

HIGH SPEED OR CARBIDE

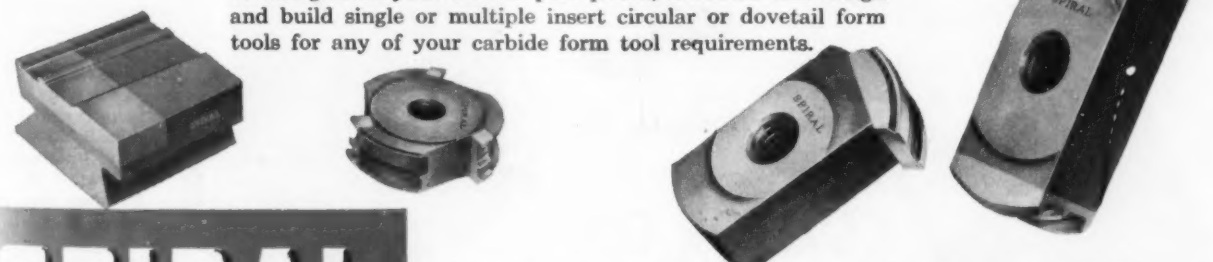
Tough cutting problems are simplified with Spiral special tools. The solution illustrated here is another example of how Spiral provides maximum tolerance control and longer tool life, while increasing production, with special tools fitted to the job.

FREE TOOL ENGINEERING HELP

For a quick answer to your specific cutting tool problems, send complete details, including tool, part print and specifications. Write for a free copy of latest bulletin showing other examples of SPIRAL time saving tools.

CARBIDE FORM TOOLS

Working from your tool or part prints, SPIRAL will design and build single or multiple insert circular or dovetail form tools for any of your carbide form tool requirements.



SPIRAL STEP TOOL COMPANY

DEPT. TE • 5400 NORTH DAMEN AVENUE • CHICAGO 25, ILLINOIS

PHONE: LOngbeach 1-5384

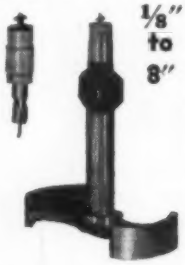
"Packaged Precision"



Measures high-precision holes to fractions of .0001", with these advantages—

Here in a compact self-contained unit, you have the high precision that has found so prominent a place in the jet engine program. By unique design, Comtorplug gives true 2-point gaging, self-aligned and centered. Thus it enables you to check any part of a hole—including very bottom—detecting out-of-round, front or back taper, bell mouth, etc.

- There are no gimmicks to get out of order, such as wiring, hose or electronic gear. And because self-contained Comtorplug has none of these, and no heavy base, it is instantly usable anywhere: machine, bench, or lab.
- Shows actual measurement to fraction of .0001", and is "just right" for Statistical Quality Control programs.
- No skill needed to use it accurately—built-in features and 10 minutes instruction do the trick.
- Marvelous thing about Comtorplug from production man's viewpoint is that you can put it to work in your shop without any planning, wiring, air lines or rigmarole—just a simple briefing on its use.
- Comtorplug is a rugged, shockproof instrument. Use it for size control at the machine as well as bench inspection, wherever you produce precision holes in volume.





Request Bulletin 46

COMTOR CO.

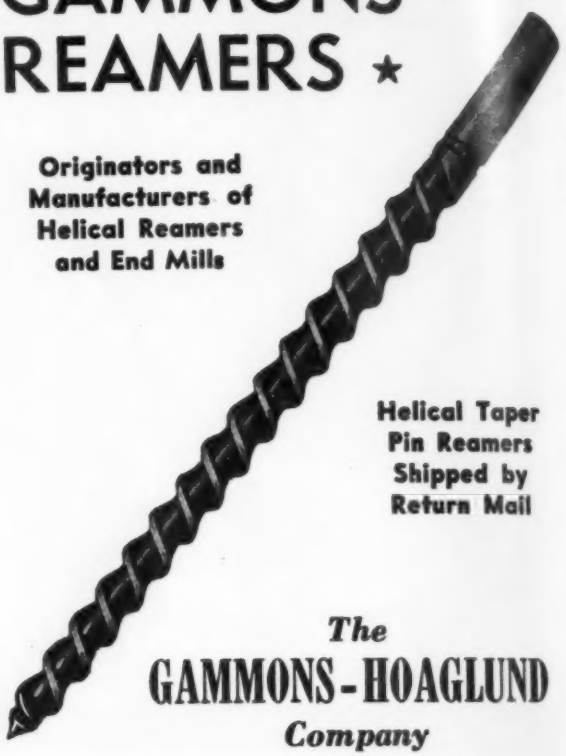
69 Farwell St.

Waltham 54, Mass.

USE READER SERVCE CARD; INDICATE A-10-216-1

GAMMONS REAMERS ★

Originators and Manufacturers of Helical Reamers and End Mills



Helical Taper Pin Reamers Shipped by Return Mail

The
GAMMONS-HOAGLUND
Company

400 Main Street, Manchester, Conn.

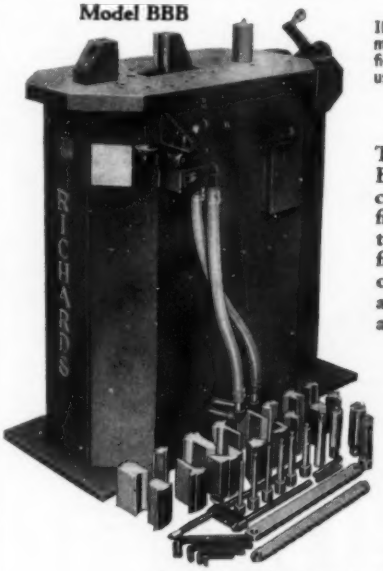
USE READER SERVICE CARD; INDICATE A-10-216-2

Multiform BIG BROTHER BENDER

Produces Without Special Tooling—Saves Die Costs Saves on Expensive Presses



Model BBB



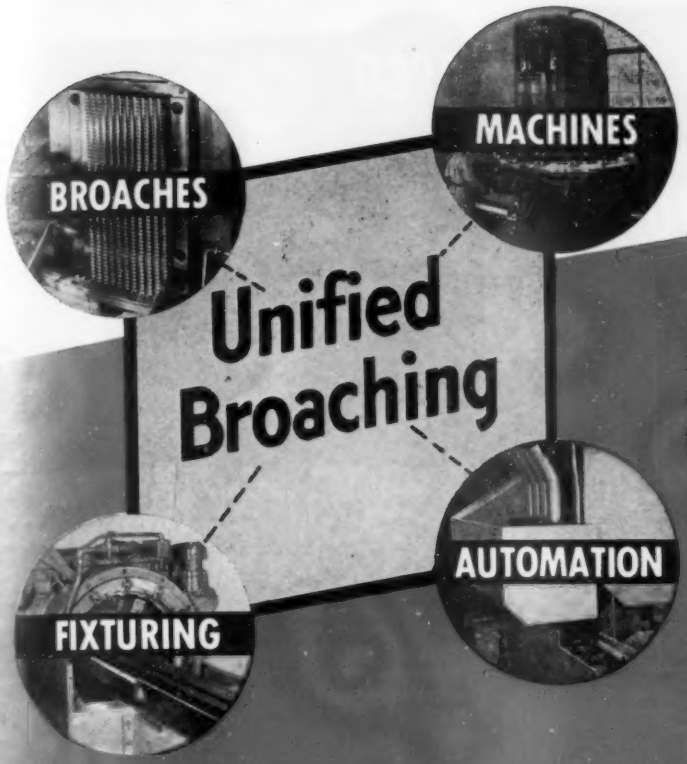
Illustrated above are a few of the many forms that can be produced efficiently on the Multiform Bender, using the standard tooling.

The heavy duty Big Brother Bender is designed for fabricating bus bars, brackets, fixtures, etc., without special tooling. Air controlled with finger tip response. Comes complete with dies, mandreb and wrenches—punching and blanking dies extra. Will punch holes up to 1" and form material up to ¼" thick by 4" wide. We also build smaller hand or air operated models for forming up to ⅛"x1¼" material.

Send for illustrated folder TE-5

J. A. RICHARDS CO. 903 North Pitcher St. Kalamazoo, Michigan

USE READER SERVICE CARD; INDICATE A-10-216-3



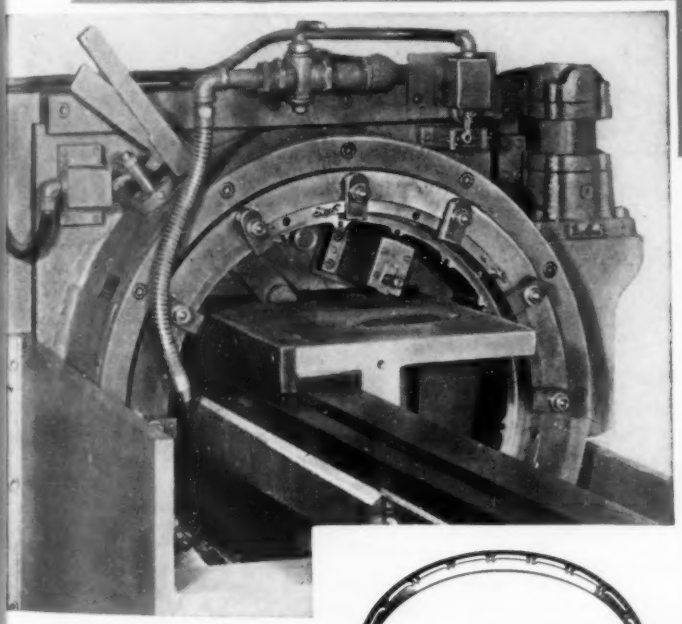
Methodized Broaching

the COLONIAL method

At Colonial, experience, imagination and competence are applied

1 to the design and manufacture of each of the individual components of a complete broaching installation, and

2 to the effective combining of ALL components into a completely UNIFIED BROACHING installation—making them work as a "team."



2 Colonials Broach JET BLADE SUPPORTS

Heat and corrosion resistant steel 22¾" I.D. jet engine blade supports, are broached on internal contours on two 10-ton 90-in. stroke standard Colonial horizontal machines at 3 per hour. 18 passes are required per machine. Metal approximately ¾" deep, 3½" wide, and ½" thick is broached in two passes.

Machines, broaches, fixtures, etc., were all designed by Colonial as a UNIFIED BROACHING INSTALLATION.



WHAT'S AHEAD IN BROACHING?

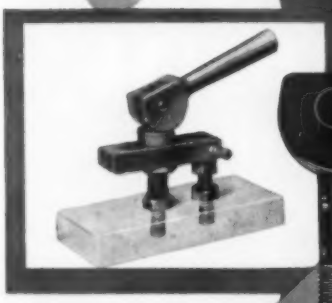
Keep up with the latest developments: Read "Broaching News". We will be glad to see you get it regularly if you will drop us a line on your company letterhead.

PIONEERS OF H.S.S. BROACHING

COLONIAL BROACH CO. DETROIT 13

Specify Morton

FIXTURE CLAMPS and COMPONENTS





Only MORTON has this special feature — Spherical Washer and Spherical Seat . . . divides stress . . . eliminates fracturing . . . positive positioning.

- COMPLETE ASSEMBLY
- DOUBLE CAM WITH HANDLE
- EYE BOLT
- SPHERICAL WASHERS
- CLAMP STRAP
- STEEL FINGER HANDLE
- FLAT WASHER
- CLAMP REST
- COIL SPRING
- JAM NUTS



Save Valuable Designing Time!

Just select the Clamp that fits your need . . . trace it into your design. Any MORTON product can be adapted to whatever changes you might specify.

Widest range of sizes and types to fit every requirement. *IMMEDIATE DELIVERY.*

MORTON assures you of QUALITY, SERVICE and FINE WORKMANSHIP.



WRITE TODAY

For our 72 page illustrated catalog. Contains full size tracing templates of each product, bound in loose leaf style for easy removal.

MORTON MACHINE WORKS

2425 WOLCOTT ST. DETROIT 20, MICH.

USE READER SERVICE CARD; INDICATE A-10-218-1

an ACCO product



WILSON "ROCKWELL"... the Jewel of Hardness Testers*

● Always the leader . . . recognized and respected. Its quality has been imitated, but never attained. The WILSON "ROCKWELL" sets itself apart—stands alone—as the jewel of Hardness Testers. WILSON accepts the responsibility of leadership.

Be sure. Look to WILSON for the hardness testers you need. Don't be satisfied with anything less than a genuine "ROCKWELL." It may cost less than you think. Write for literature and prices.

ACCO **Trade Mark Registered*

WILSON MECHANICAL INSTRUMENT DIVISION
AMERICAN CHAIN & CABLE

230-H Park Avenue, New York 17, N. Y.

WILSON "ROCKWELL" and TUKON Hardness Testers

USE READER SERVICE CARD; INDICATE A-10-218-2



INDIVIDUAL VULCANAIRE DUST COLLECTING UNITS

Are used on surface and other grinders where grinding dust must be removed.

Inexpensive, compact units, with no moving parts. Operated from your present air supply.

Installed in a few minutes, eliminating need for costly centrally located dust collecting systems.

The collector element is mounted on the side of the machine. Quickly cleaned, requiring no refills.

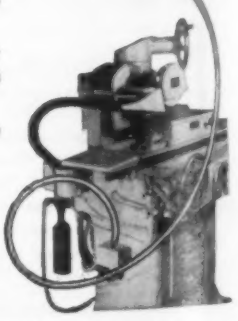
Vac-suction pick-up device (vacuum nozzle) is mounted on the grinding wheel guard or close to grinding wheel on other applications. This mounting permits constant contact with dust as the wheel is moved up or down.

A simple needle valve operates the unit, and can be shut off whenever the machine is not in use.

Available in two sizes: 700 series for grinding wheels 7" dia. or less—200 series for wheels 2" dia. or less.

Made by the makers of Vulcanaire *The* jig grinding attachment.

Write on your letterhead for "Dust Collector" Booklet.



VULCAN TOOL CO.
7300 Lorain Street, Dayton, Ohio

USE READER SERVICE CARD; INDICATE A-10-218-3

for Precision

+ Low Cost:

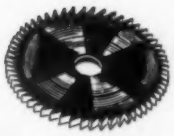
MIKRON

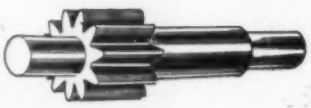
GEAR HOBBER #79

Mikron Hobbing Machines Excel Where High Precision Machining Standards Must Be Maintained



• **MIKRON No. 79** is an excellent choice for small spur gears and pinions. It is simple to operate, to set-up and to change-over from job to job. CAPACITY: Gears, max. dia. $1\frac{9}{16}$"; max. length of cut $1\frac{1}{8}$"; number of teeth 6 to 390; pitch DP 26 and finer.







RUSSELL, HOLBROOK & HENDERSON, INC.

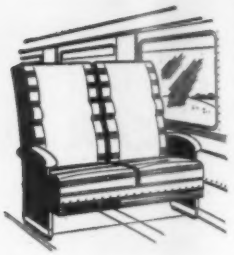
292 Madison Avenue, New York 17, N. Y.



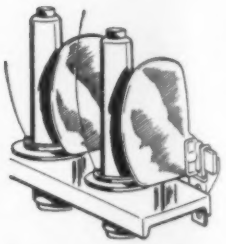
UNBRAKO BUTTON HEAD SOCKET SCREWS feature the following: threads to head; low head height; nonslip internal wrenching; hex socket that minimizes possibility of marred or mutilated heads; fully formed threads—Class 3 fit; heat treated alloy steel; standard sizes from #8 through ⅝" diameter.

Our Fiftieth Year

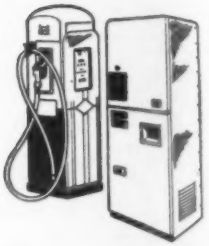
A START FOR THE FUTURE



USE UNBRAKO BUTTON HEAD SCREWS on transportation equipment—door and window frames, paneling, seats.



On textile machinery—slashers, twisters, bobbin shields.



On sheet metal assemblies—beverage coolers, gasoline pumps.

Have you checked our UNBRAKO standards?

We suggest you do, because a standard UNBRAKO delivered from your distributor's stock means faster and better service. A standard will do the job as well as a special at much lower cost. For details about UNBRAKO Standards, write STANDARD PRESSED STEEL Co., Jenkintown 37, Pa.



Write for UNBRAKO Standards

UNBRAKO® SOCKET SCREW DIVISION

SPS

JENKINTOWN PENNSYLVANIA

There's a Walker Magnetic Chuck

New Fi...

better than just good

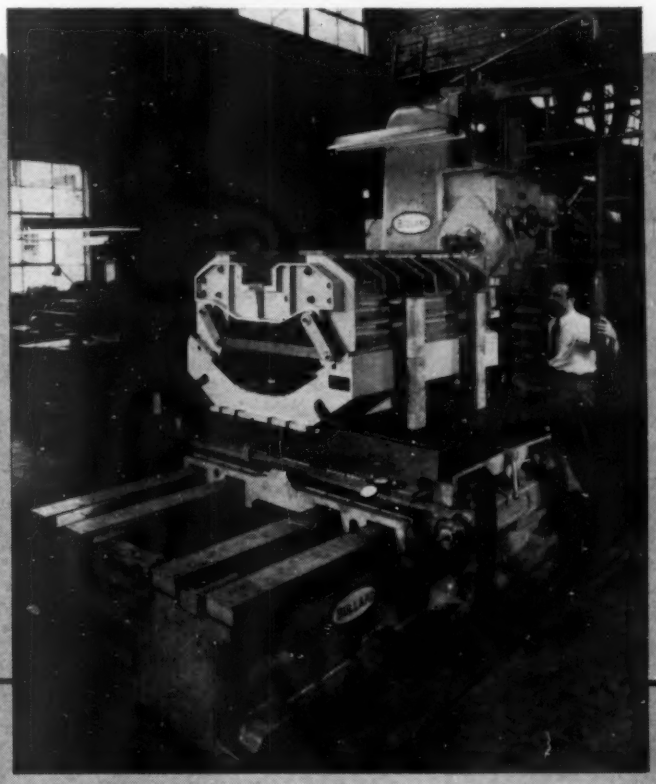
when considering your new machines, *demand*

this 4-way bed Bullard Horizontal Boring, Milling and Drilling Machine

At Best Tool and Engineering Company, Detroit, Michigan where they are making Packard Motor Car Co. fixtures for milling upper half of aircraft engine crankcases, they rely upon the ruggedness and accuracy of these Bullard Horizontal Boring, Milling and Drilling machines for the finest of workmanship in their products.

Even though these fixtures are not a production run, Best Tool and Engineering have found that the versatility and reliability of these Bullard machines provide a profitable, precision method for machining.

A satisfied customer is the best proof of a machine's performance and ability.



- Rigidity of BULLARD 4-Way bed CONSTRUCTION
- Advantages of BULLARD NON-METALLIC bearing surfaces
- Smooth operation from HYDRO-DYNAMIC Coupling Drive
- Machine versatility BULLARD inbuilt ACCURACY.

The **BULLARD** *Company*

BRIDGEPORT 2, CONNECTICUT

There's a Walker Magnetic Chuck for Every Known Application . . .



For sixty years, Walker has specialized in the designing and production of magnetic holding devices. Today, Walker produces a complete line of magnetic chucks and designs special chucks to meet unusual holding problems.

●

Standard Electro and Permanent Magnetic Chucks . . . Vacuum Chucks . . . Special Applications for various holding problems . . . Demagnetizers . . . Magnetic clutches.

Original Designers and Builders of Magnetic Chucks

O. S. WALKER CO. Inc.

WORCESTER 6, MASSACHUSETTS

USE READER SERVICE CARD; INDICATE A-10-222-1

GEORGE L. *Detterbeck Quality Tools*

SPEED UP Screw Machine Production

SELECT YOUR NEEDS FROM THIS LIST

We specialize in

CUTTING CAMS
•
HIGH SPEED STEEL AND CARBIDE FORM TOOLS
•
SPECIAL CUTTING TOOLS
•
SPLIT DRILL BUSHINGS
•
CROSS SLIDE KNURL HOLDERS
•
TOOL BITS
•
BOX TOOLS
•
BURNISHING TOOLS
•
REVOLVING STOPS
•
RECESS SWING TOOLS
•
FORMING SWING TOOLS

Inasmuch as we manufacture cams and tools for the trade we obviously do so on a production basis. As a result we offer:

1. Superior type tools . . . at low cost.
2. Practical design based upon many years of experience.
3. Correct specifications which insures maximum service.

Your tool requirements in our hands is your guarantee of better tools at a great saving.

PROMPT DELIVERIES

Tool making with us is a routine matter. Special equipment . . . skilled hands . . . plus know how, enables us to fill orders in a minimum of time.

SERVICE

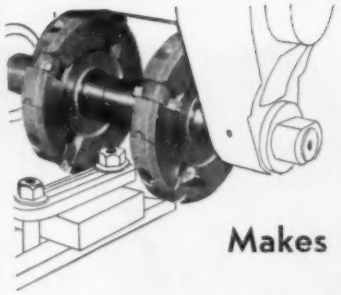
Let us quote on your tool requirements. You'll save money . . . even as compared with "home made" tools. Standard circular form tools for B&S and Davenport Machines carried in stock. Immediate delivery.

COMPLETE ENGINEERING

GEORGE L. DETTERBECK CO., Incorporated 1871 Clybourn Ave., Chicago 14, Ill.

ENGINEERS TO AN INDUSTRY

USE READER SERVICE CARD; INDICATE A-10-222-2



New-Field UNIVERSAL FLY CUTTER

Makes 4-6 cuts in one operation!

Uses standard bits!

Straddle milling with New-Field cutter









These are only a few of the many different types of cuts possible with a New-Field Universal Fly Cutter.

No need now for special cutters for many types of milling if you use the New-Field Universal Fly Cutter. One New-Field cutter using any type of high speed steel or carbide bits makes multiple cuts in one operation. Standard bits are easily reground or replaced when needed for other work. Down time is cut to minimum.

New-Field Cutters fit all standard arbors on horizontal or vertical mills or drill presses, turn to any required speed, have adjustable bits to permit slots of any shape from 3/16" to 2" for fly cutting, slotting, surface and straddle milling, gear cutting, disc and gasket cutting. Available in 4", 6", 8" and 10" sizes, also 6" and 8" heavy duty size designed especially for Shell End Mill Arbors. Write today for details on this versatile, money-saving tool!

NEW-FIELD MACHINED PARTS CO.

210 W. 7th St., Los Angeles 14, Calif.

EXPORT OFFICE: STATES TRADING CO., 401 BROADWAY, N. Y. 13

Cable: STRADESO, New York

USE READER SERVICE CARD; INDICATE A-10-222-3

GROBET CHATTERLESS COUNTERSINKS

They are terrifically popular because the six staggered cutting edges are scientifically designed to give a shearing cut and thus eliminate all chatter.
Made in 12 sizes in all degrees; also supplied as sets in strong Kit-cases.



Send for HC1 Sheet Catalo

GROBET FILE CO. of AMERICA, INC.

421 CANAL STREET, NEW YORK 13, N. Y.

USE READER SERVICE CARD; INDICATE A-10-222-4

READ ALL ABOUT THE LATEST IN AIR GAGING

JUST OFF THE PRESS, this book contains up-to-the-minute, complete specifications for the Dimensionair. It explains the important advantages of the new balanced air system. It also tells about our entirely new air gage accessories — the Arnold Air Grinding Gage, Air Electric Switch, and Air Gaging Electronic Controls. You will also find useful tables showing plug, ring, and air snap sizes available from stock. Here, conveniently available in one attractive catalog, is a fund of the latest authoritative reference data on the Air Gage, developed by Federal during many years' study of actual shop use requirements and engineering research. Ask for your copy today and profit from this valuable new book.





You need this new catalog. See the handy diagrams and information-packed pages. Here's a book that fully covers the latest developments in air gaging.

FEDERAL

Largest manufacturer devoted exclusively to designing and manufacturing all types of DIMENSIONAL INDICATING GAGES

FEDERAL PRODUCTS CORPORATION
1910 Eddy Street, Providence 1, Rhode Island

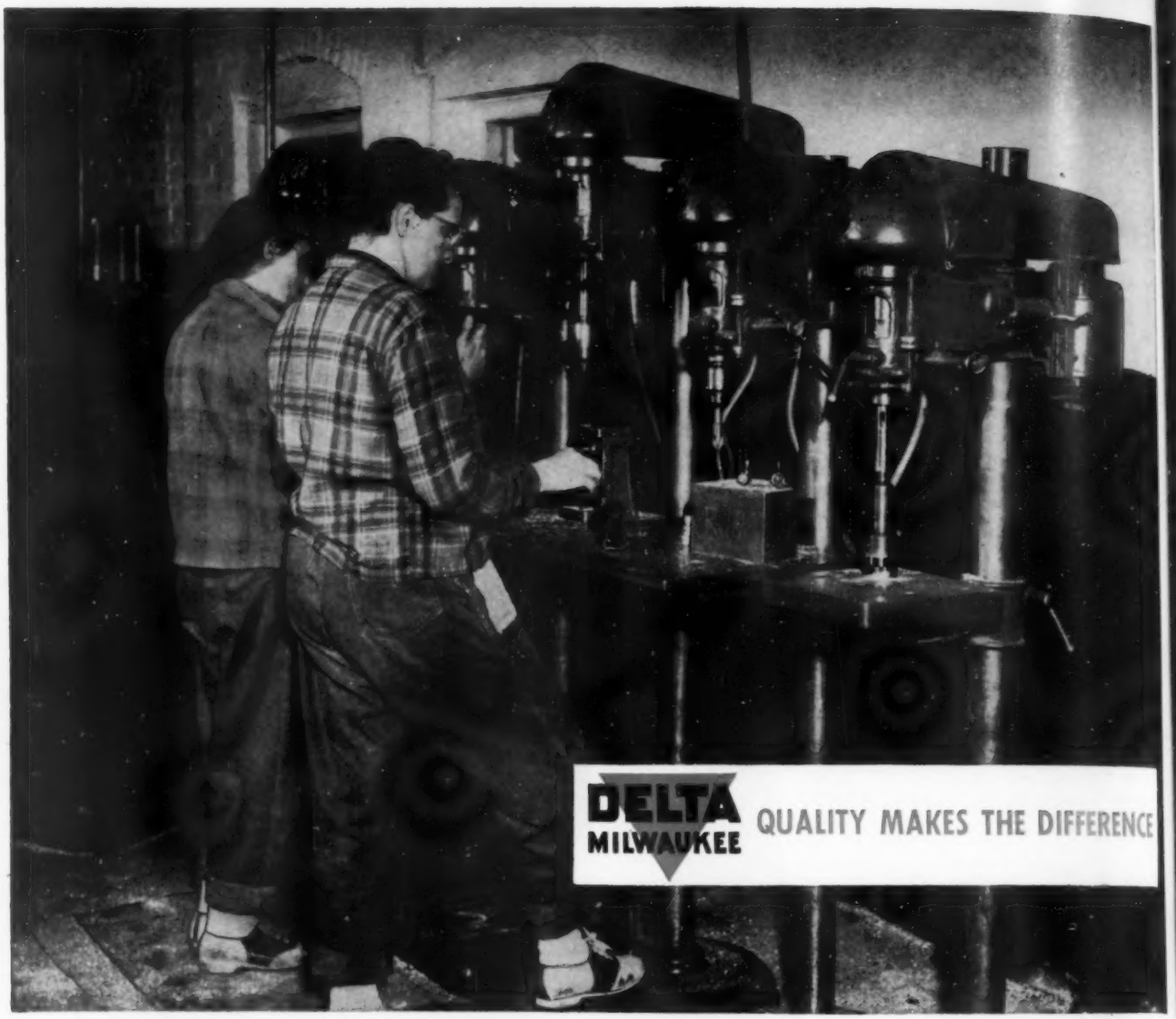
Please send me your new catalog on Air Gaging.

Name..... *Title*.....

Company.....

Street.....

City..... *State*.....



TELL US, MR. CURTIS——

Why did you buy 200 DELTA Drill Presses?

"Three vital advantages built into Delta Drill Presses explain why we use 200 of them," says Charles Curtis, Production V. P. of Copeland Refrigeration Corp., Sidney, Ohio . . .

"1. **PRECISION**—a must. We fight 'tenths' in this business; normally, .002" undersize is scrapped.

"2. **VERSATILITY**—you can mount Delta drill presses upside-down, sideways, gang them in numerous ways.

"3. **LOW INVESTMENT**—numerous permanent set-ups ready for all operations are vastly cheaper than a few that involve set-up time, labor and scrap cost resulting from constant changes of set-ups. We make a variety of plates, heads and parts, and can make a run on one piece simply by taking jigs and fixtures off the shelf.

Direct labor saving of $24,000
a year on one operation

"As for special tools, here's one that out-performs a $16,000 radial drill press. We cut a Delta drill press pedestal in two, put an extension between, mounted the unit on an idle heavy base, fastened a swivel on each half-pedestal, mounting the drill head—and obtained a knee action that does all the radial drill did, only much better. The special Delta rig costing not over $300, operates at 2400 RPM as against 400 RPM; drills more than 200 pieces per day, as against 30-35 pieces; uses 3 men (always ahead of schedule) as against 7 men (always behind)—for a two-shift direct labor saving of $24,000 a year.

"No wonder we like Deltas."

Nothing here that a bit of ingenuity and common sense can't duplicate! —with cash benefits that can easily run big. Ask your Delta dealer for the latest Delta Catalog—listed in your Classified Directory under "Tools," —or write direct to Delta Power Tool Division, Rockwell Manufacturing Company, 620K N. Lexington Ave., Pittsburgh 8, Pa.

DELTA QUALITY POWER TOOLS

Another Product by **Rockwell**

UNION



Unretouched Photograph
by Morton Berger

Perfectly designed for its job . . . .

Union's long experience in the cutting tool field reflects itself in the excellent performance of every tool it makes.

UNION TWIST DRILL COMPANY • ATHOL, MASSACHUSETTS

Milling Cutters **Gear Cutters** **Twist Drills** **Hobs** **Reamers** **Carbide Tools**

OWNERS AND OPERATORS OF: **S. W. CARD MANUFACTURING CO. DIVISION, Mansfield, Mass.** TAPS, DIES, SCREW PLATES
BUTTERFIELD DIVISION, Derby Line, Vermont DRILLS, TAPS, DIES, REAMERS, COUNTERBORES, SCREW PLATES
BUTTERFIELD DIVISION, Rock Island, Quebec MILLING CUTTERS, TWIST DRILLS, HOBS, REAMERS, TAPS, DIES, SCREW PLATES

SERVICES AVAILABLE TO ASTE MEMBERS AND CHAPTERS

Items listed below are available for individual ASTE members and chapters at nominal charges shown.

MEMBER SERVICES

Membership Emblem Button for Juniors and Seniors, enamel on gold	$ 1.00
Chapter Chairman's Emblem Button, gold with Rubies	11.00
Past Chapter Chairman's Emblem Button, gold with Diamonds	38.00
Past Chapter Chairman's Emblem Button, gold with Sapphires	8.00
Membership Certificate, blue and gold print on white stock, unframed	2.00
Membership Certificate, same as above but framed in a black wood frame	2.75
The Tool Engineers Handbook, to members	11.00
The Tool Engineers Handbook, to non members	15.00
Data Sheets, to members	no charge
Data Sheets, to non members ..... per sheet	.10
Data Sheet Binder, ASTE Emblem and words DATA SHEETS imprinted	2.50
Zipper Binder, large, ASTE Emblem imprinted, space for other imprinting provided	8.50
1953 21st Annual Meeting Technical Papers ..... each	.50
or any 4 papers for	1.00
1953 21st Annual Meeting Panel Discussions ..... each	1.00
or 3 papers for	2.00
1953 21st Annual Meeting Technical Papers and Panel Discussions, complete bound volume	4.00

CHAPTER SERVICES

Gummed labels, addressed to Chapter membership ..... per hundred	.60
Window Envelope Inserts, addressed to Chapter membership ..... per hundred	.60
Letterhead Stationary, blue half tone with black letters bearing Chapter address ..... 250 for	3.50
500 for	5.00
per 1000	7.50
Return address envelopes, window or non window ..... per 1000	8.00
Second sheets, plain, white or yellow ..... per 1000	2.00
Copy sheets, white with AMERICAN SOCIETY OF TOOL ENGINEERS and COPY printed in black ..... per 1000	4.00
ASTE Banner, blue satin with gold lettering reading AMERICAN SOCIETY OF TOOL ENGINEERS and bearing ASTE emblem. Banner is complete with a rod inserted at the top and a gold colored cord for hanging.	15.00

(Imprinting of Chapter name and number can be done but at extra cost)

Orders for any of the above items must be accompanied by remittance. (ASTE Chapters may, upon request, have the purchase price deducted from their next allocation check) Please direct all orders to:

AMERICAN SOCIETY OF TOOL ENGINEERS

10700 Puritan Avenue **Detroit 21, Michigan**



Photograph by Morton Berger

TAPS *by* CARD

The quality is greater than the price. **When you specify Card Taps you get far more than fine steel expertly engineered. You get the benefit of an accumulation of experience in tap making that dates back 79 years.**

Completely stocked offices at Chicago, Detroit, Fort Worth, Los Angeles, New York, San Francisco and Seattle.

See your local Card distributor for prompt deliveries and helpful service

S. W. CARD **MANUFACTURING CO., MANSFIELD, MASS.** • DIVISION OF UNION TWIST DRILL CO. CARD Quality **TAPS • DIES • SCREW PLATES**

40 YEARS

OF LEADERSHIP

Management and employes take pride in announcing to our many friends and customers that Eclipse Counterbore Company became 40 years of age in May. From a humble beginning in 1913 to a position of leadership in 1953, Eclipse is today truly synonymous with quality in the cutting tool industry. This healthy maturity could never have been attained without the help of those same friends and customers . . . and so to them we say "Sincere Thanks."



The orginal Eclipse interchangeable single-diameter counterbore created in 1913.

A modern multi-diameter carbide tipped Eclipse Cutter.



1913

1953

ECLIPSE COUNTERBORE CO.

Founded in 1913

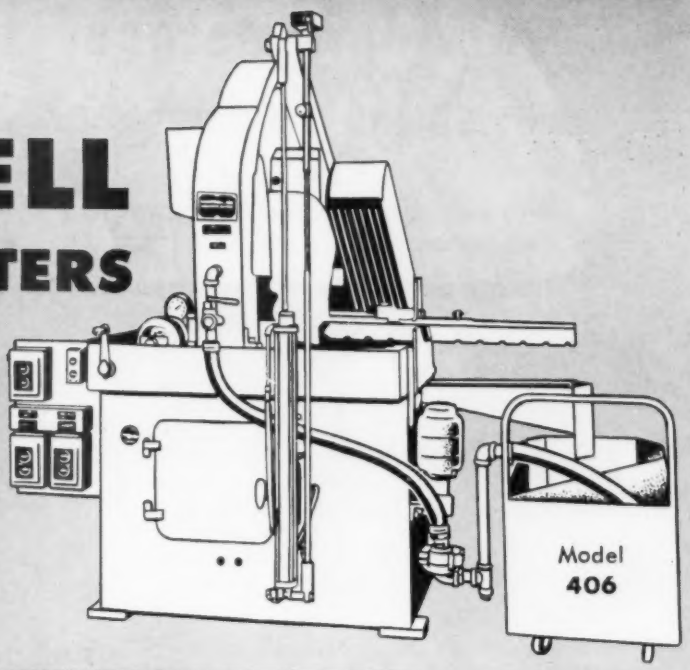
DETROIT 20, MICHIGAN

ACCO products

See These Machines—

CAMPBELL
ABRASIVE CUTTERS

For fast, clean, accurate cutting of hard, soft, round, hex, square, or shaped stock



... at the

National Metal Exposition

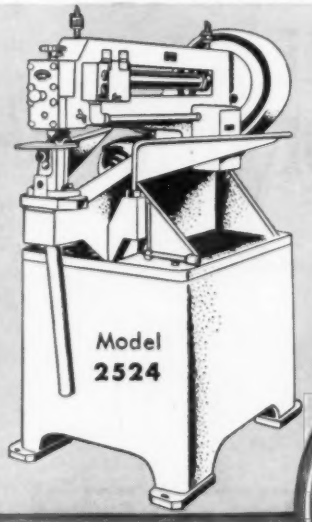
CLEVELAND

OCTOBER 19 to 23 • BOOTH 1716

See the Campbell Cut-Off Machines and Nibblers in action!

CAMPBELL
NIBBLERS

Cut odd shapes from ferrous or non-ferrous shapes



ACCO

TRADE MARK

CAMPBELL MACHINE DIVISION
AMERICAN CHAIN & CABLE

945 Connecticut Ave., Bridgeport 2, Conn.

CAMPBELL
Abrasive Cutters and Nibblers



You're missing something if you overlook

CRUCIBLE HOLLOW TOOL STEEL

Visit us at Booth 241, National Metal Show, Cleveland, O., Oct. 19-23



If you make tool steel parts with machined-out centers, don't overlook the many benefits of using Crucible Hollow Tool Steel.

It eliminates drilling, boring, cutting-off and rough facing operations. Naturally, this cuts overall production time, steps up machine capacity and reduces scrap losses. Many manufacturers have been able to cut material costs alone by as much as 20% when they use Crucible Hollow Tool Steel instead of regular bar stock.

Crucible Hollow Tool Steel is available in three famous grades: KETOS oil hardening, AIRDI 150 air hardening, and SANDERSON water hardening tool steels. We supply it with machine finished inside and outside diameters and faces – cut to your specific length requirements. And no steel producer can assure you of more uniform quality. For we have complete control over every phase of manufacture and distribution.

For more information, call the Crucible warehouse nearest you . . . or write for new brochure describing Crucible Hollow Tool Steel. Address Crucible Steel Company of America, Dept. T, Oliver Bldg., Pittsburgh 22, Pa.

CRUCIBLE first name in special purpose steels

53 years of Fine steelmaking

HOLLOW TOOL STEEL

CRUCIBLE STEEL COMPANY OF AMERICA • TOOL STEEL SALES • SYRACUSE N. Y.

Transmission Valve Body 10 3/10¢ each

Kingsbury

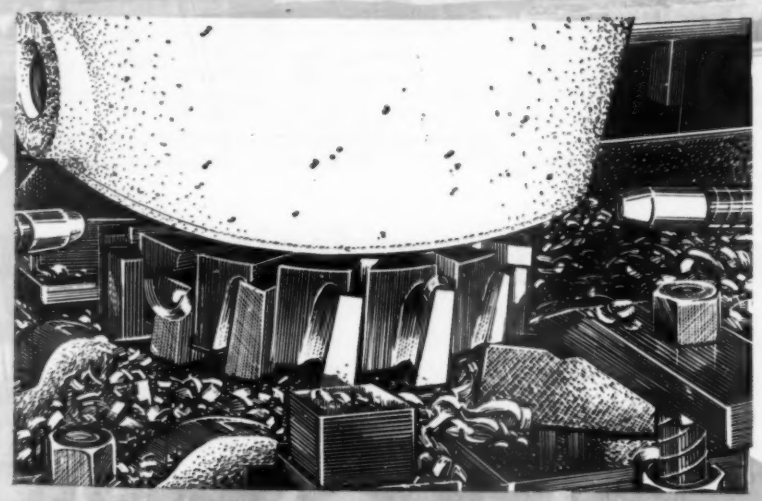
OK MILLING CUTTERS IN THE AIRCRAFT INDUSTRY—NO. 8

OK milling cutters hogmills centerslot of counterweight forging for world's most powerful piston aircraft engine

Great advancements have been made in the art of milling metal in recent years, especially in the aircraft industry. And, no where is this better exemplified than at the new Pratt & Whitney Aircraft plant at North Haven. Here, everything is ideal. Ample room for every operation. Hundreds of milling machines, all kinds, sizes. Thousands of metals cutting tools. Here, you get a realistic definition of the meaning of close tolerances.

In the illustration, an OK face mill is rough-milling a slot 3/16 x 8" in a tough steel forging for a counterweight used in the Wasp Major engine.

OK milling cutters are favorites of the aircraft industry—engine builders, frame manufacturers, component part makers. OK cutters have more beef in the body, are heavier size for size. Blades once driven home, sit secure, unmovable. Mated serrations prevent side-sway and form an accurate measurement for blade advancement to compensate for wear. Mills with this fine adjustment feature reduce grinding to less than .005" per blade.

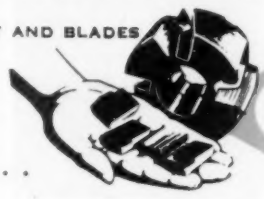


OK MILLING CUTTER ON A MILWAUKEE VERTICAL SEMI FINISH—MILLS SLOT OF A TOUGH AIRCRAFT STEEL FORGING AT NEW PRATT & WHITNEY AIRCRAFT PLANT, NORTH HAVEN, CONNECTICUT.

Write for OK Tool Catalogs

"MODERN MILLING CUTTERS FOR MODERN MILLING MACHINES"
"AMERICA'S FIRST SYSTEM OF SINGLE POINT TOOLS"

TWO COMPONENTS—BODY AND BLADES
SIMPLE . . .
STRONG . . .
SUFFICIENT . . .

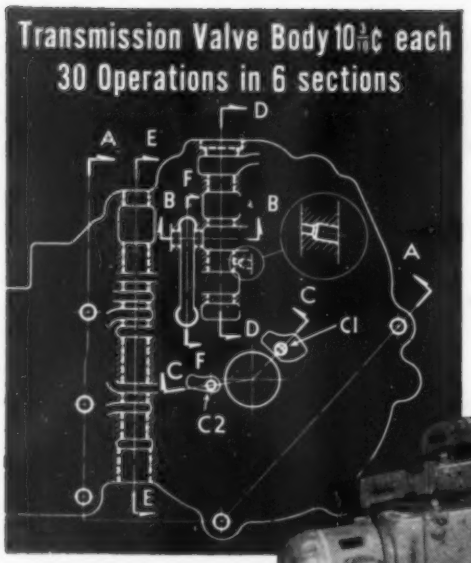


OK

modern milling cutters for modern milling machines

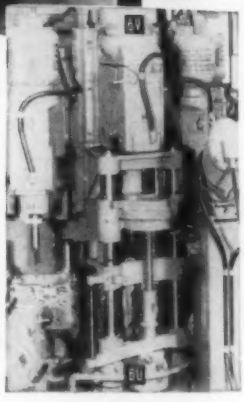
THE OK TOOL COMPANY INC. Milford, New Hampshire

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-229



Kingsbury give you

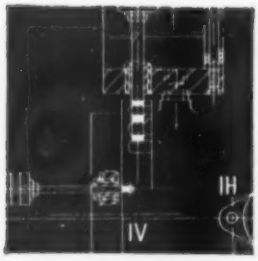


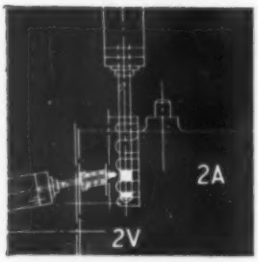


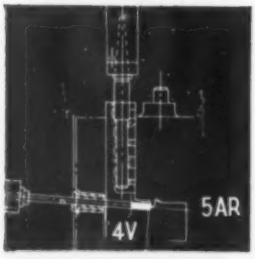
This Kingsbury central column machine has knees for mounting 3 Horizontal (H) Units and 8 Angle (A) Units. The central column mounts 11 Vertical (V) Units, one of which has two heads, one above the work and the other under it (U). Some of the units have multiple spindles. The 60-inch index table has 12 stations — one for loading and unloading.

The machine performs 30 operations: drilling, c'boring and reaming. Some of these are illustrated below.

This Kingsbury produces 176 pieces per hour gross at an average cost of 10.26¢ per piece.





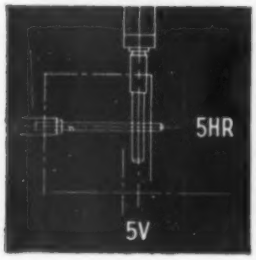


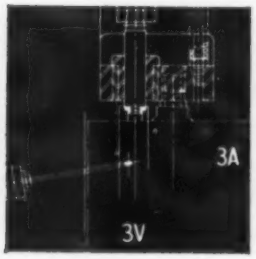
Follow this Transmission Valve Body

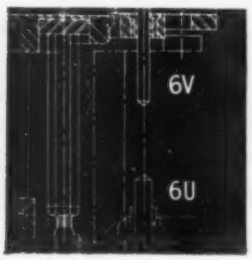
Section A: Unit 1H .281 drill — 5 thru-holes.

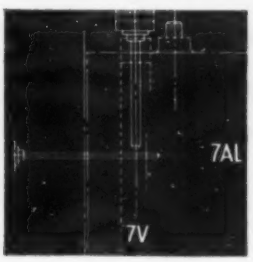
Section DD: Five vertical and three angle units prepare this long valve hole thru five walls. It must be straight, accurate, parallel with Section EE, and finished ready for borizing. Unit 1V .437 drills thru three walls; Unit 2V .437 drills thru the fifth wall. Units 4V and 5V rough- and semi-finish step-ream the hole. Unit 3V step-c'bores .812 and .640 at entrance to hole.

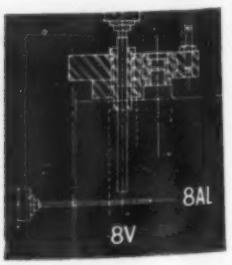
Angle units finish the port at the fourth wall. Unit 2A .156 drills $\frac{15}{64}$ deep; Unit 3A .096 drills thru and Unit 10A .1115 reams this hole.











Special Purpose Machines are custom-built to high production at low cost

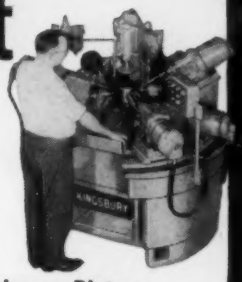
Units of 1/2 to 5 hp drill, ream, c'bore, mill, tap, thread — all accurately and economically

Operations are combined to insure accuracy, speed production, save money. The piece is chucked only once. It travels through the machine cycle, stopping successively at stations where Kingsbury Units complete their operations within predetermined time limits. At some stations several units work on the piece simultaneously. The operator loads and unloads the machine — there is no rehandling. Accurate machining reduces scrap. And think of the floor space saved!

If you have a suitable piece which requires a combination of these machining operations, it will pay you to investigate a Kingsbury. We can tell you whether or not we could develop a machine to make the piece in quantity at satisfactory cost. In fact, we would not tackle the job unless we could!

Kingsbury Machine Tool Corp.
102 Laurel Street, Keene, New Hampshire

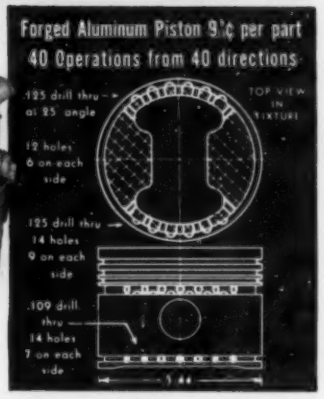
KINGSBURY
AUTOMATIC DRILLING AND TAPPING MACHINES
for Low-Cost High Production



Forged Aluminum Piston
60 Pieces per Hour Gross — 9-9/10¢ per Piece

This compact machine has a 60-inch base with 6 units mounted around a central work fixture. Operator loads the part, trips a valve and watches the machine go through an automatic cycle that takes 41 seconds.

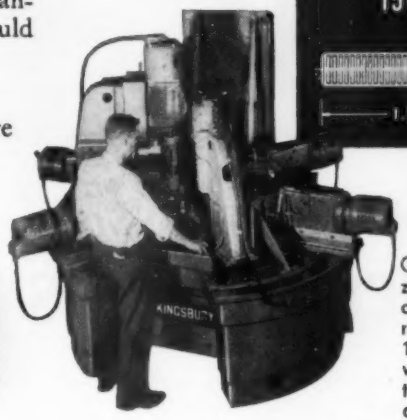
The piston indexes on its own axis. First index 26° 15′, then 5 indexes of 14° each to complete 12 angular holes in upper ring groove. Heads 1A & 4A do this work.



Next index 16° then 1 index of 18° and 5 indexes of 14° complete 14 horizontal holes in lower ring groove. Heads 3H & 6H do this work.

Next index 43° 30′, then 6 indexes of 15° to complete 14 horizontal holes in upper ring groove. Heads 2H & 5H do this work.

Now index 26° 15′ to bring work to loading position. Machine stops automatically, job is finished.





Stainless Steel Bolt
460 Pieces per Hour Gross — 1-9/10¢ per Piece

On an 80-inch diameter base, four horizontal and two vertical units spot drill, drill thru, flat-bottom and burr-ream as required. The 12-inch index table has 12 work fixtures, and each rotates clockwise. Work fixtures rotate 90° when the table indexes 30°. Bushing carriers insure accuracy.

through 30 operations — with only one chucking

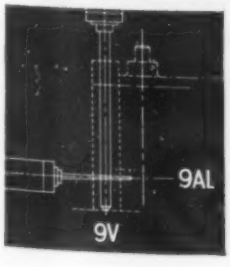
Section EE is another long valve hole thru nine walls, prepared for borizing. Vertical units perform 7 operations.

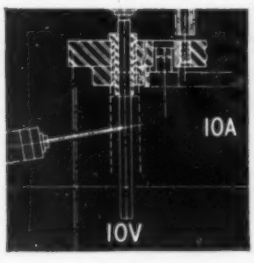
Unit 6V .422 undersize drills down thru two walls. Unit 6U .625 drills up thru ninth wall. Unit 7V .421 drills down thru three more walls. Unit 8V .4531 end-reams the hole thru five walls. Unit 9V .453 drills the hole thru. Units 10V and 11V .4687 rough end-ream and .4882 semi-finish ream the hole.

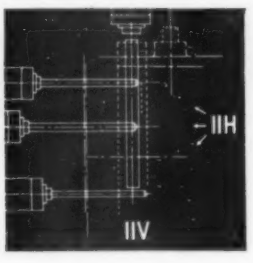
Section FF: Unit at 11H drills .343 dia. and .281 dia. partial holes shown; and four .281 dia. holes not shown.

Section BB: Unit 5H Right .312 drill thru both walls.

Section CC: Unit 5A Right .218 drills hole C1 full depth. Four Units operate on step-hole at C2; Unit 5A Left .060/.065 drills thru; Unit 7A Left .156 drills 17/32 deep; Unit 8A Left .094 drill undersize, and Unit 9A Left .094/.096 reams the hole.







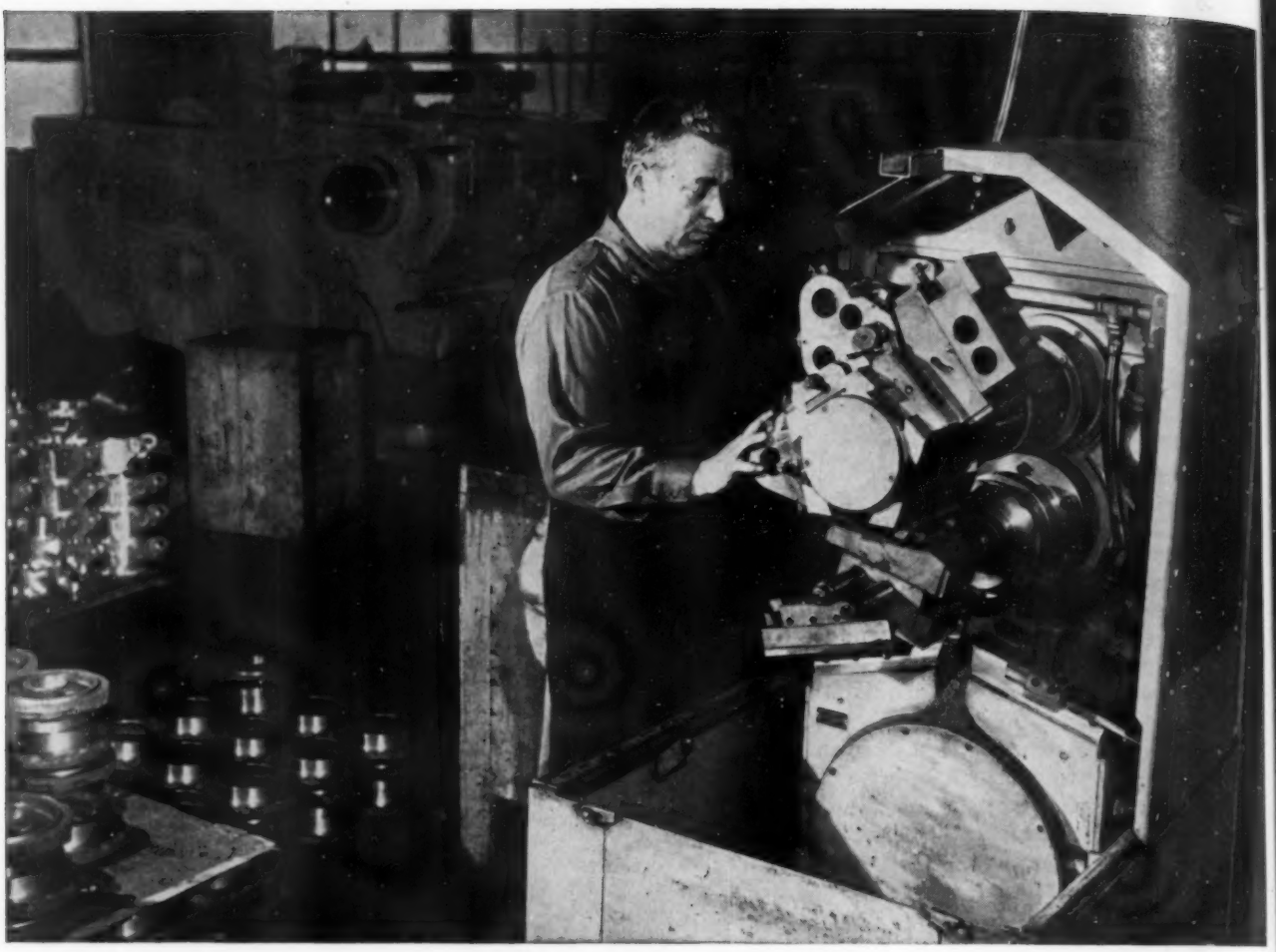
Each Unit Cost on the drawings
includes the cost of the man and of the machine — no power or overhead. We assumed:

Unit cost of man equal to:

$$\frac{\text{average U. S. hourly wage}}{\text{hourly gross} \times 80\% \text{ efficiency}}$$

Unit cost of machine to be:

$$\frac{\text{price of tooled machine}}{\text{output in 6000 hrs. @ 80\% efficiency}}$$



When Precision was the Pay-Off!

HALEY MACHINE CO., Springfield, Ohio, recently installed a Warner & Swasey 1 AC Single Spindle Automatic Chucking Machine to turn vital, high-precision hydraulic pump parts for U. S. Army tanks. The job called for extreme accuracy, because these pumps are filled under pressure with an antifreeze that has a tendency to leak where water will not.

To avoid leakage these extremely close tolerances had to be held—40 to 63 micro-inch finish on surface finishes, .002" on forming, .0008" to .001" on turning, and .001" in concentricity. Maintaining such accuracy with previous methods was difficult—scrap loss was too high. Production had to be speeded up.

The Warner & Swasey Automatic took the function of holding these close tolerances out of the operator's hands—substituting the automatic operation of this high-precision machine for the job. Production was doubled—in some cases tripled! Scrap loss was reduced 12 to 15%!

This type of consistent accuracy is just not possible by manual methods due to the human error of even the best machinists. It is even unusual for an automatic. But the Warner & Swasey 1 AC has the rigidity, the *built-in* accuracy, plus the ability to repeat accurate settings to handle the *most difficult* jobs!

WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-232

alignment



any time, any place . . .

REX HIGH SPEED STEEL *is always the same, too*

You get the same outstanding performance from every Rex product no matter where or when you buy it. That's because every heat of Crucible Rex High Speed Steel is given a careful metallurgical laboratory examination to insure that each piece meets Crucible's high standard of uniformity.

And its high cutting efficiency, uniform hardening response, and combination of maximum red hardness and toughness make Rex High Speed Steel the standard choice in important shops throughout the country.

When you need high speed steels specify REX. They are readily available from all Crucible warehouses and leading distributors everywhere.

Rex® High Speed Steels
Peerless Hot Work Steels
Halcomb 218
Chro-Mow®
Sanderson Carbon Tool Steels
Ketos®
AirKool Die Steel
Airdi® 150
Nu-Die V Die Casting Steel
CSM 2 Mold Steel
La Belle® Silicon #2
Atha Pneu

SPECIFY YOUR TOOL STEELS BY THESE BRAND NAMES

WRITE TODAY for the unique Crucible Tool Steel Selector, 9" diameter, in 3 colors — a twist of the dial tells you which tool steel is best for your application. Address your request to Crucible Steel Company of America, Dept. T, Oliver Building, Pittsburgh 22, Pa.

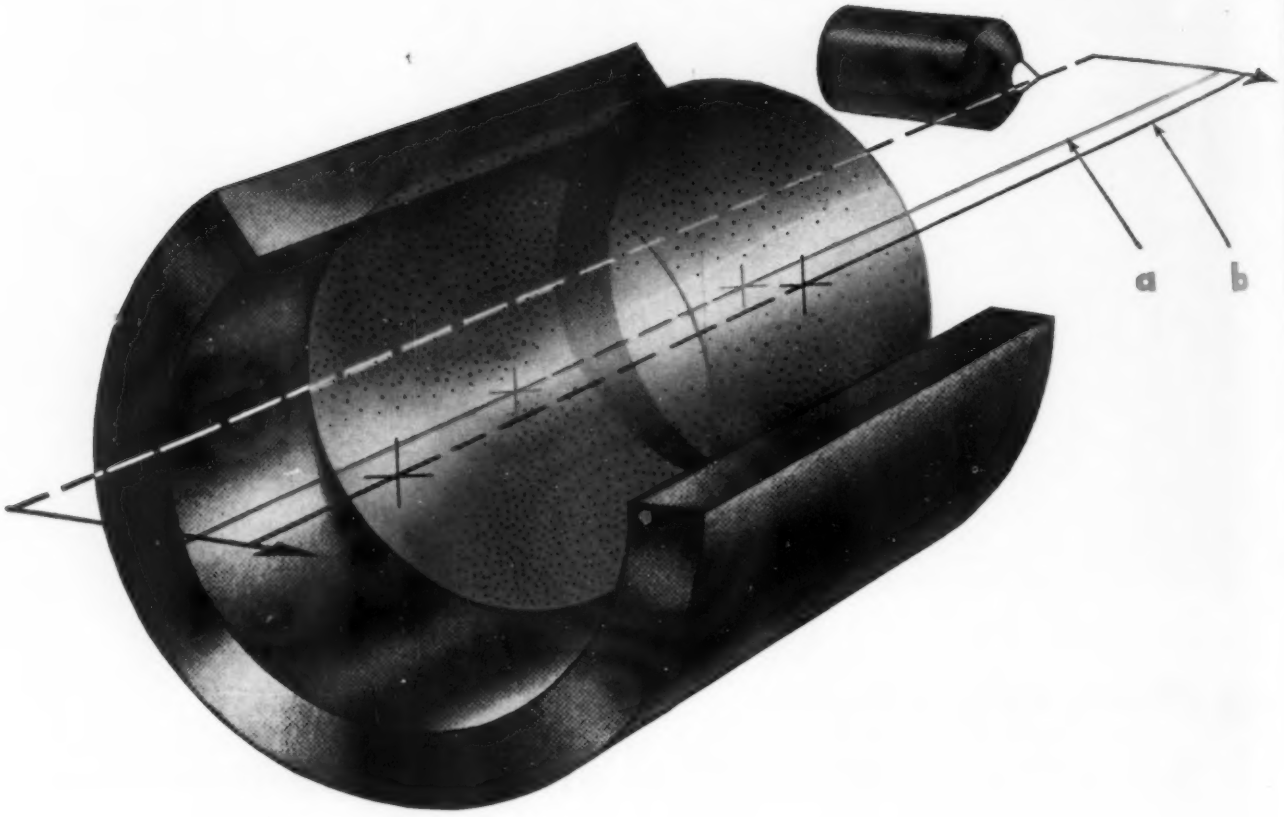
CRUCIBLE first name in special purpose steels

53 years of Fine steelmaking **TOOL STEELS**

CRUCIBLE STEEL COMPANY OF AMERICA · TOOL STEEL SALES · SYRACUSE, N. Y.

alignment

for better internal grinding

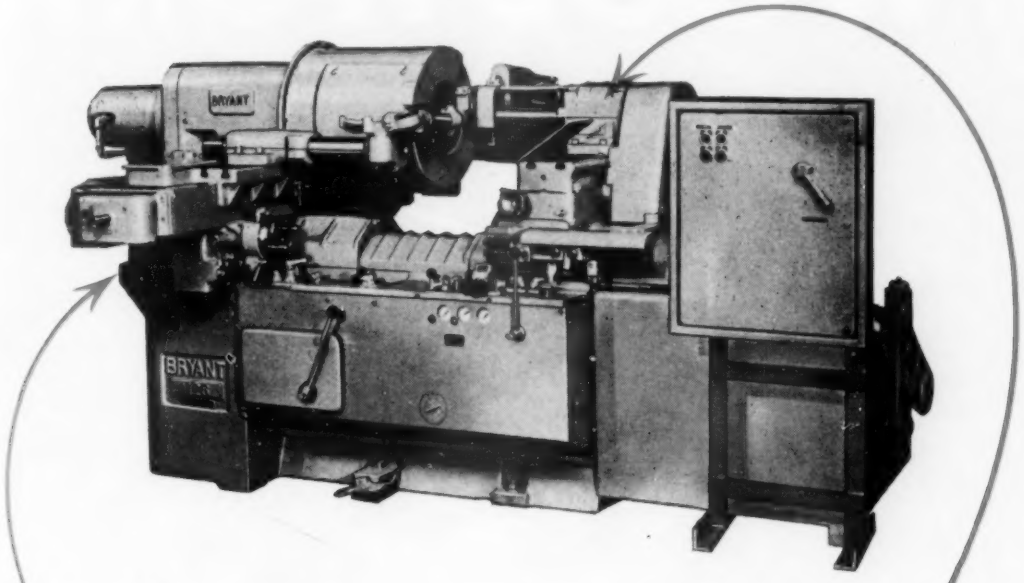


THE heart of the internal grinding process is the line of contact between the wheel and the work. This contact line must be straight for the full length of the wheel and the full length of work as the wheel traverses. If the contact is not a straight line, the internal grinder is "out of line". Improper alignment may show up in the work as incorrect hole geometry (bell-mouth or taper) and poor surface finish. In addition, excessive wheel wear and poor wheel action may result.

Several elements contribute to the straightness of this line of contact: first, the path along which the wheel is traversed "a" must be a straight line; second, the axis of the wheel must lie in a plane parallel to the wheel path "a", and third, the axis of the work "b" must be parallel to the wheel

path "a". For production grinding, the diamond must lie in the plane established by the wheel axis and the work axis.

Perfect alignment means that the slides must be straight and true, the wheel and work spindles must be in line and "zeroed" for center heights and the diamond must be on "dead center" of the wheel. A full, straight line of contact will extend wheel life, improve wheel action, and will assure correct geometry and required finish.



Left end of workhead may be raised or lowered to bring its axis into a plane parallel with wheelslide bar.

Rear of wheelslide may be adjusted to insure straight line motion of the wheel.

This heavy-duty, semiautomatic machine, with hydraulic controls, has a 26″ swing and will grind holes with a maximum depth of 12″. Although designed for large, heavy work, a selection of wheelheads is available to grind holes as small as 1″ in diameter. The extremely rugged bed provides the strength and rigidity necessary for vibrationless operation. The workhead has two positions, one for grinding and a forward position for ease in loading and checking large work. The wheelhead is adjustable to grind work up to 15° included angle. The Bryant workhead and wheelhead slides are anti-friction to provide extremely accurate grinding and sensitive control.

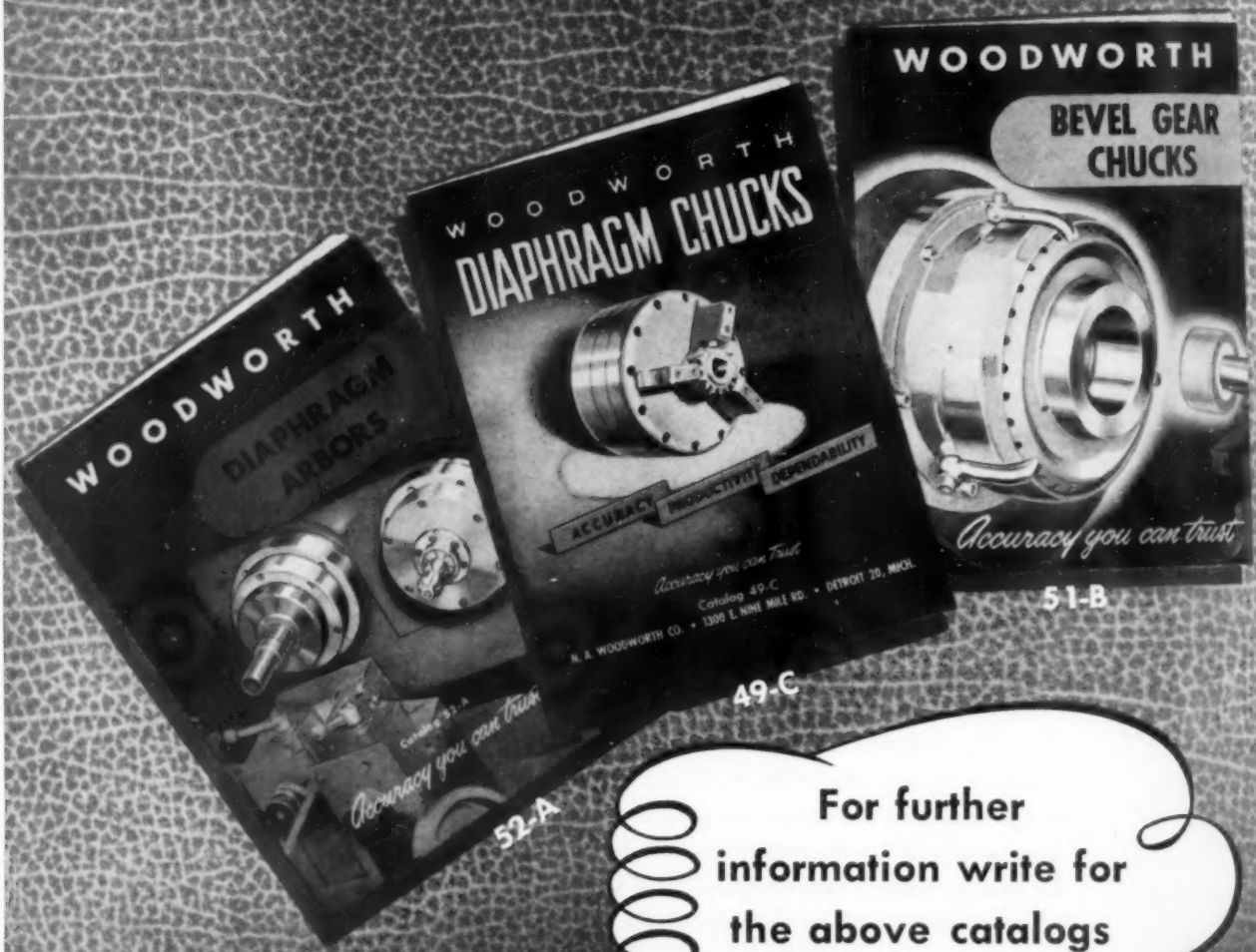
Write for "Alignment" booklet which gives complete details on this interesting subject. Also ask for booking form on new sound, color movie — free showings arranged for engineering groups.

Bryant Chucking Grinder Company

Springfield, Vermont, U. S. A.

Internal Grinders • Internal & External Thread Gages • Granite Surface Plates • Boring Machines

Precision Chucking by WOODWORTH



For further information write for the above catalogs

Accuracy you can trust

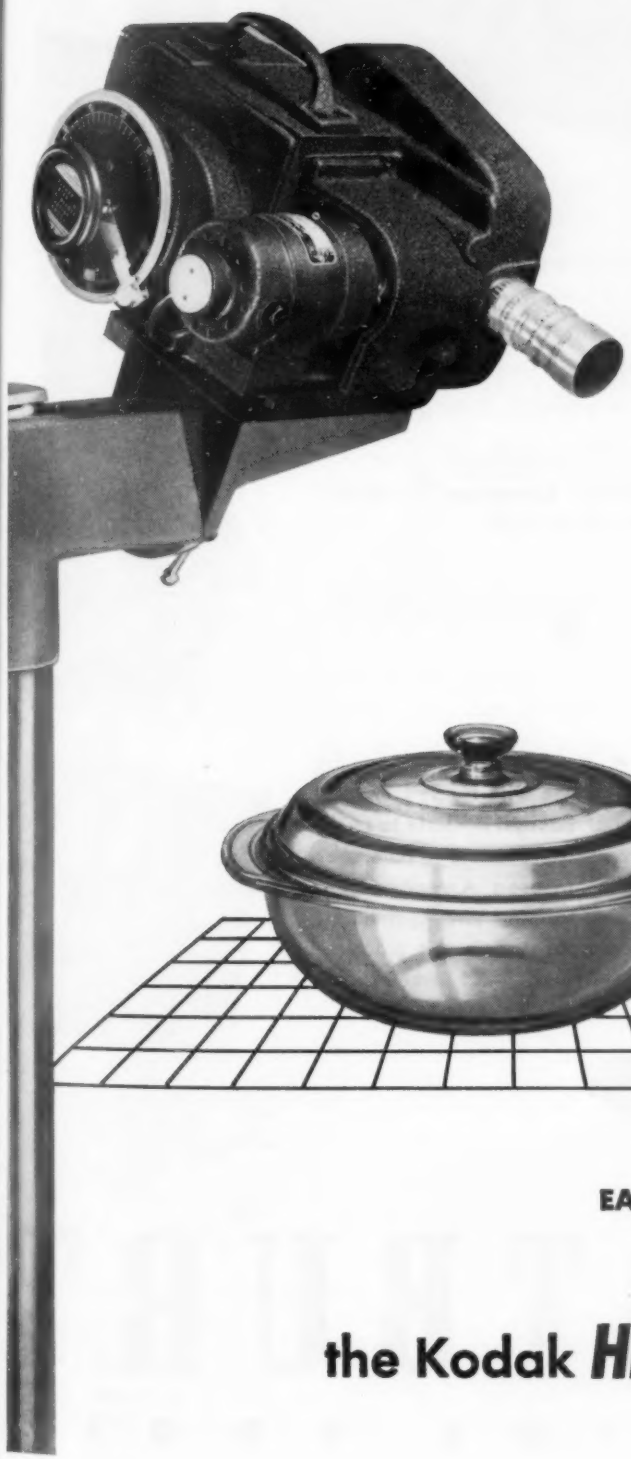
WOODWORTH

N. A. WOODWORTH CO., SALES DIVISION, 1300 E. NINE MILE ROAD • DETROIT 20, MICHIGAN

PRECISION GAGES • CONE-LOK JIGS • DIAPHRAGM CHUCKS AND ARBORS • PRECISION PARTS

Kodak

This camera helped speed production of PYREX® casseroles



The solution to production problems may sometimes be right in front of your eyes, yet can't be seen because the operation in question is moving at high speed.

Corning Glass Works' engineers had just such a problem in machining a new high-heat-conductivity alloy into dies that were expected to press molten glass into Pyrex casseroles faster and more economically. When trouble in machining this alloy made its use doubtful, it was decided to film the tool bit, as it operated at 246 r.p.m., with their Kodak High Speed Camera.

This camera takes motion pictures at speeds up to 3200 frames a second, slows motion as much as 200 times when the films are projected at normal speed. Study of their film showed Corning engineers that chips were sticking to one side of the tool bit, even though the tool was new. Further grinding was tried, and another study clearly showed the problem was solved. The special alloy *could* be properly machined, and the camera had helped show how.

Corning's high speed camera keeps busy finding answers to all sorts of problems involving mechanical action too fast for the eye to see.

A new booklet, "High Speed Motion Picture Making In Industry," is now available. It gives you complete details on the Kodak High Speed Camera, and shows how a number of industries have used this versatile instrument to solve difficult product design and performance problems. For your copy, write to:



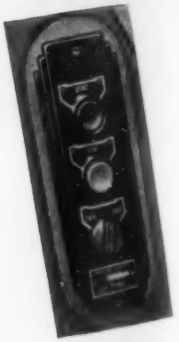
Industrial Photographic Division
EASTMAN KODAK COMPANY, Rochester 4, N. Y.

the Kodak *HIGH SPEED* Camera

FOOTBURT

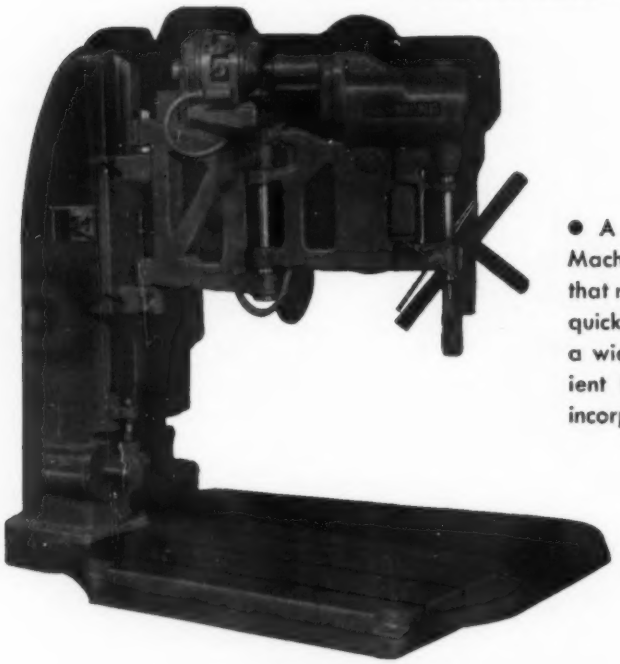
machine tools
for *increased*
production





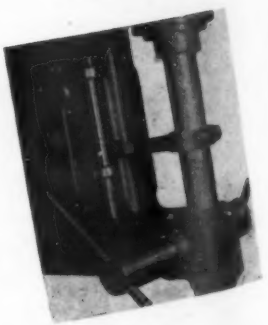
● Here is a machine designed to perform light drilling and tapping operations at high speed with minimum of effort. Any one of six spindle speeds may be quickly selected and tapping is always instantly available without any adjustments to the machine. It makes an excellent choice for miscellaneous work on a large layout of varying size holes.

THE FOOTE-BURT COMPANY, Cleveland 8, Ohio
Detroit Office: General Motors Building





● A Unique Radial Drilling Machine with Hinged Bracket that makes it possible to swing quickly from hole to hole over a wide area. A very convenient tapping arrangement is incorporated in this machine.



engineered for production

FOOTBURT

MACHINE TOOLS

STRETCH YOUR TOOL BUDGET!

with WAUKESHA INSERTED BLADE SPADE DRILLS

You save important money

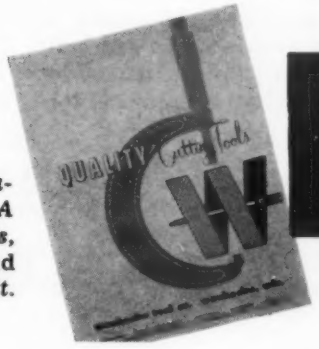
drilling deep holes...
large holes...bottoming...
chamfering



because:

- ☆ like your safety razor you replace only the blade in your WAUKESHA *Inserted* Blade Spade Drill. The body lasts for many years.
- ☆ WAUKESHA furnishes standard stub shank spade drill heads for deep hole drilling . . . you provide low-cost holders made from tubing. Saves you expense of special tools.
- ☆ Costs less than high speed twist drills.
- ☆ Standard tools in stock from 1-1/32" to 5" diameters.

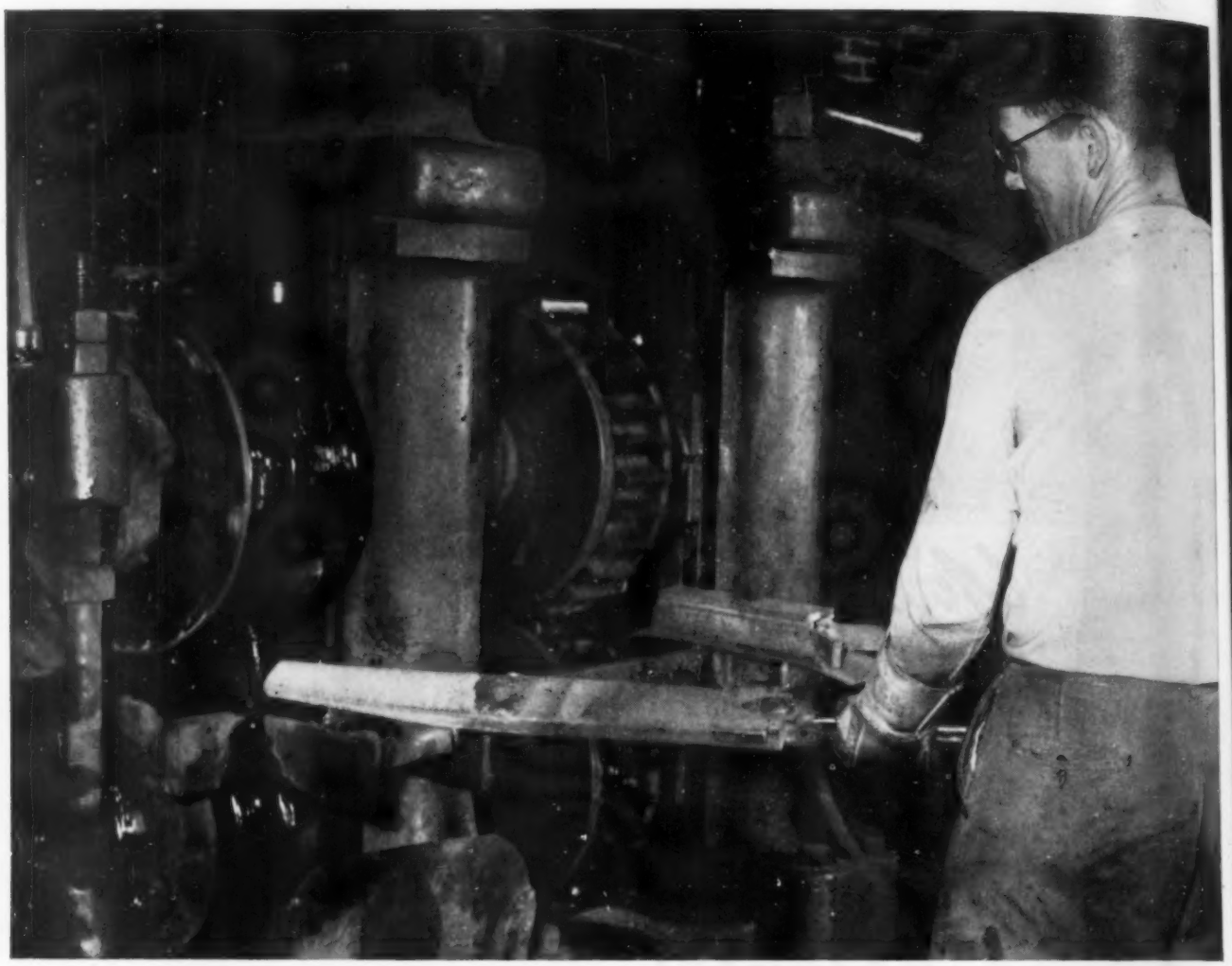




Here's a REAL reference catalogue. Shows all WAUKESHA Tools . . . reamers, spade drills, floats . . . gives all sizes and complete prices. Send for it. Mail a postcard — today.

WAUKESHA TOOL CO.

WAUKESHA, WISCONSIN



10 TIMES THE PRODUCTION LIFE

FROM THESE "CAST-TO-SHAPE" SWAGING DIES

SEND FOR THIS NEW CATALOG
"FORGING AND CASTING PRODUCTS"

It's hot off the press with full details on FCC Air Hardening, Oil Hardening and other Cast-to-Shape Tool Steel Specialties that can save you time and money . . . also Composite Die Sections, and Smooth-Hammered Forgings in a wide range of tool and stainless steels. *Don't wait—get your copy NOW.*

Write Today

ADDRESS DEPT. TE-46

The John Deere Plow Works of Deere & Company formerly used cast grey-iron dies to swage AISI 1070 F steel plow beams. Die life was, at best, a mere six weeks or about 8,000 parts.

They switched to A-L CAST-TO-SHAPE swaging dies of FCC No. 66 tool steel, hardened and drawn to 57-58 Rockwell "C". The new dies ran *fourteen months*—eight hours a day, five days a week—before redressing was necessary. Approximately *83,875 Parts* (over ten times the production) were swaged in that period! Production has been maintained at that level since.

You, too, can save time and money with the modern FCC CAST-TO-SHAPE method of tool and die making. Don't forget, you also buy *less* steel and reduce machining costs. It's a matter worth investigating. • Check with your A-L representative TODAY . . . or write *Allegheny Ludlum Steel Corporation, Oliver Building Pittsburgh 22, Pennsylvania.*

For complete **MODERN** Tooling, call

Allegheny Ludlum

AL
FINE TOOL STEELS
SINCE 1854



KEARNEY & TRECKER MILWAUKEE MACHINE TOOLS

Kearney & Trecker offers NEW FREE BOOK on solutions to production metalworking problems

THIS illustrated booklet will show you how to make profitable use of our Special Machinery Division's new $5,200,000 expansion. In addition to demonstrating how to use our Customer Engineering Service, the book illustrates typical special machines and tooling already built... the more than $2,000,000 worth of equipment available to work on the machines you need. Fill out and mail this coupon today. There's no obligation, of course.

SPECIAL MACHINERY DIVISION
Kearney & Trecker Corporation
6784 W. National Ave., Milwaukee 14, Wis.

Please send me a copy of the booklet "Doorway to a Proven Method for Solving Big and Small Metalworking Problems."

Name_____

Title_____

Company Name_____

Address_____

City_____ Zn.____ State_____



Why pay for the steel you waste when you make hollow parts?

WHEN you make hollow parts from bar stock, you pay for chips and shavings you bore out and throw away! With Timken® seamless tubing, you eliminate this waste. The hole's already there. Finish boring is often the first production step. You cut machining time—get more parts per ton of steel.

You make your machine tools more productive by using Timken seamless tubing. Screw machine stations normally used for drilling can be released for other jobs. You get added machine capacity without additional machines.

To save you even *more* steel, the Timken Company's engineers will study your problem and recommend the most economical tube size for your hollow parts job—guaranteed to clean up to your dimensions.

Timken seamless tubing has fine forged quality. That's because the piercing process by which it is made is basically a forging operation. It gives the tubing a uniform grain flow for greater strength and a refined grain structure which brings out the best in the quality of the metal. The Timken Company's rigid quality control makes sure the quality is always uniform from tube to tube and heat to heat. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH



SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING



IN A HOLE?

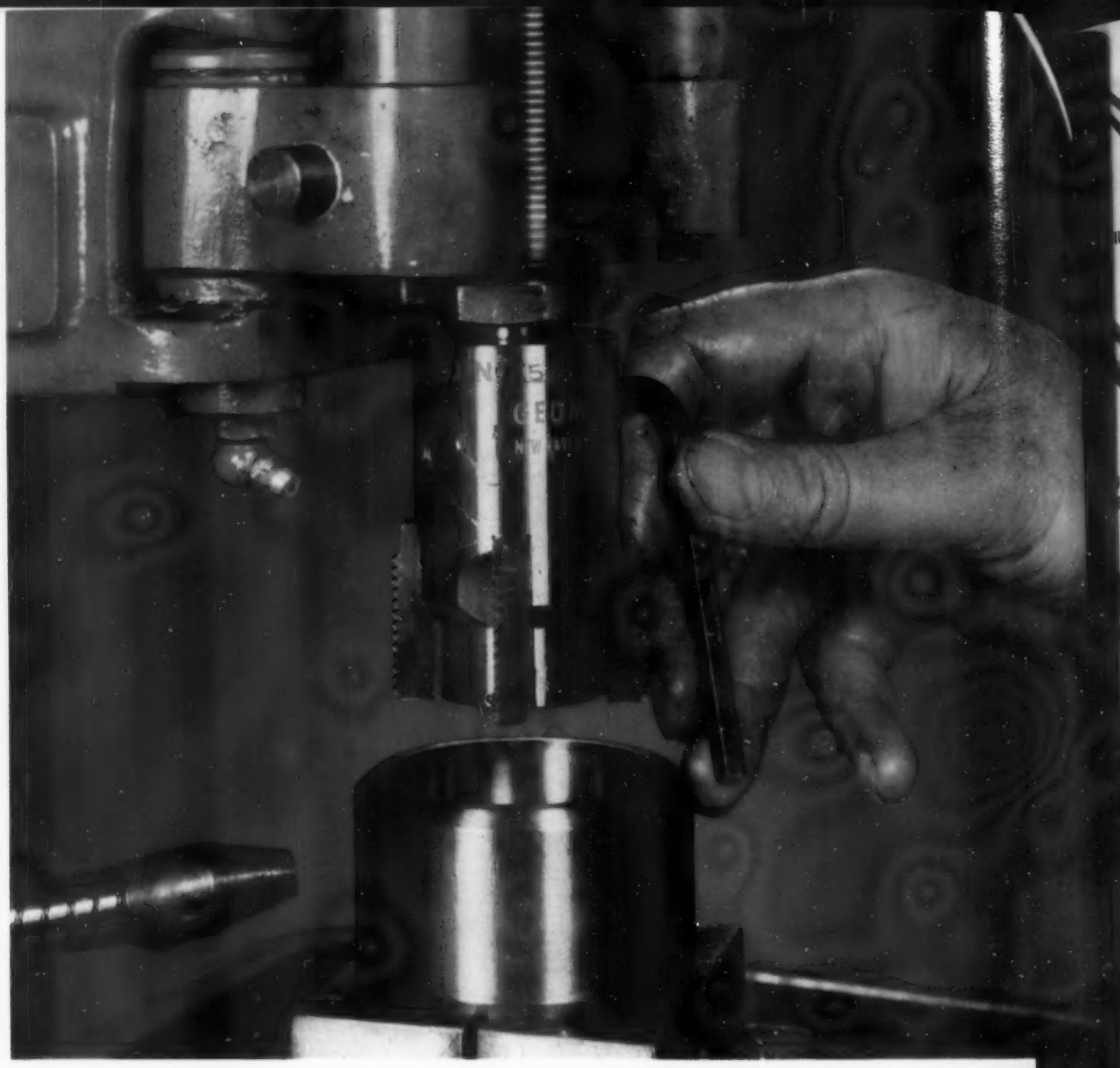
Here's a tough threading job that could be done only with an "Acorn" Die easily. The compact holder and protruding die lands permit entering the counter bored hole and cutting threads right down to the bottom.

Only a holder body, a cap and a one piece die! Put them together and you have a high speed production tool that is really rugged, accurate and dependable.

Cutting sizes #0-80 to 1½"-12." Holders for many types of machines.

GREENFIELD TAP AND DIE CORPORATION

GREENFIELD, MASS.



IT'S SOLID . . ADJUSTABLE . . COMPACT!

Whenever you need an adjusting tap, but can't use a collapsing tap . . . especially where tooling space is limited and fast withdrawal not necessary . . . you'll find the GEOMETRIC Class SJ Solid Adjustable Tap ideal. This short, stubby tap will give you the advantages of fast adjustment to required decimal sizes or different class of thread and may be used for more than one pitch by the use of interchangeable chasers!

Class SJ taps available in eleven sizes covering the cutting range $1\frac{5}{16}$" through $8\frac{1}{2}$".

Write for full details. Specify Bulletin SJ

Greenfield Tap and Die Corporation

GEOMETRIC TOOL COMPANY DIVISION

NEW HAVEN 15, CONNECTICUT





The Man Who Swallowed a Fortune

"Here," shouted Seigneur de Sancy to his bodyguard. "Here are the marks of the melée. Find my poor Pierre and there, I know, you will find the diamond."

When they found the grave in the forest, they found, too, that the brave old retainer, carrying the great jewel to King Henry IV of France (so that he could pawn it to finance his armies) had foiled the robbers at the cost of his life. When his stomach was slit open, there lay the Sancy diamond.

For lending his diamond to France, Henry made de Sancy ambassador to the court of Queen Elizabeth of England, who liked the jewel so much that she bought it. It passed to Charles I, who lost his head on the block, and, later, to James II, who fled to France after a disastrous defeat and sold the Sancy to Louis XIV for $125,000 —a fancy price in those days for a diamond of 53½ carats.

During the Revolution, it was stolen with the Crown Jewels of France, found weeks later in a gutter in the Champs Elysées, quickly stolen again, re-discovered in 1828 when it was sold to Prince Demidoff of Russia for $100,000. Today, it is said to be back in India, where it was originally found, probably a thousand years ago.

First cousins to these great diamonds of history are the fine industrial diamonds we import for American industry. Our 43 years of specialization is at your service through our field engineers.

WHEEL TRUEING TOOL COMPANY

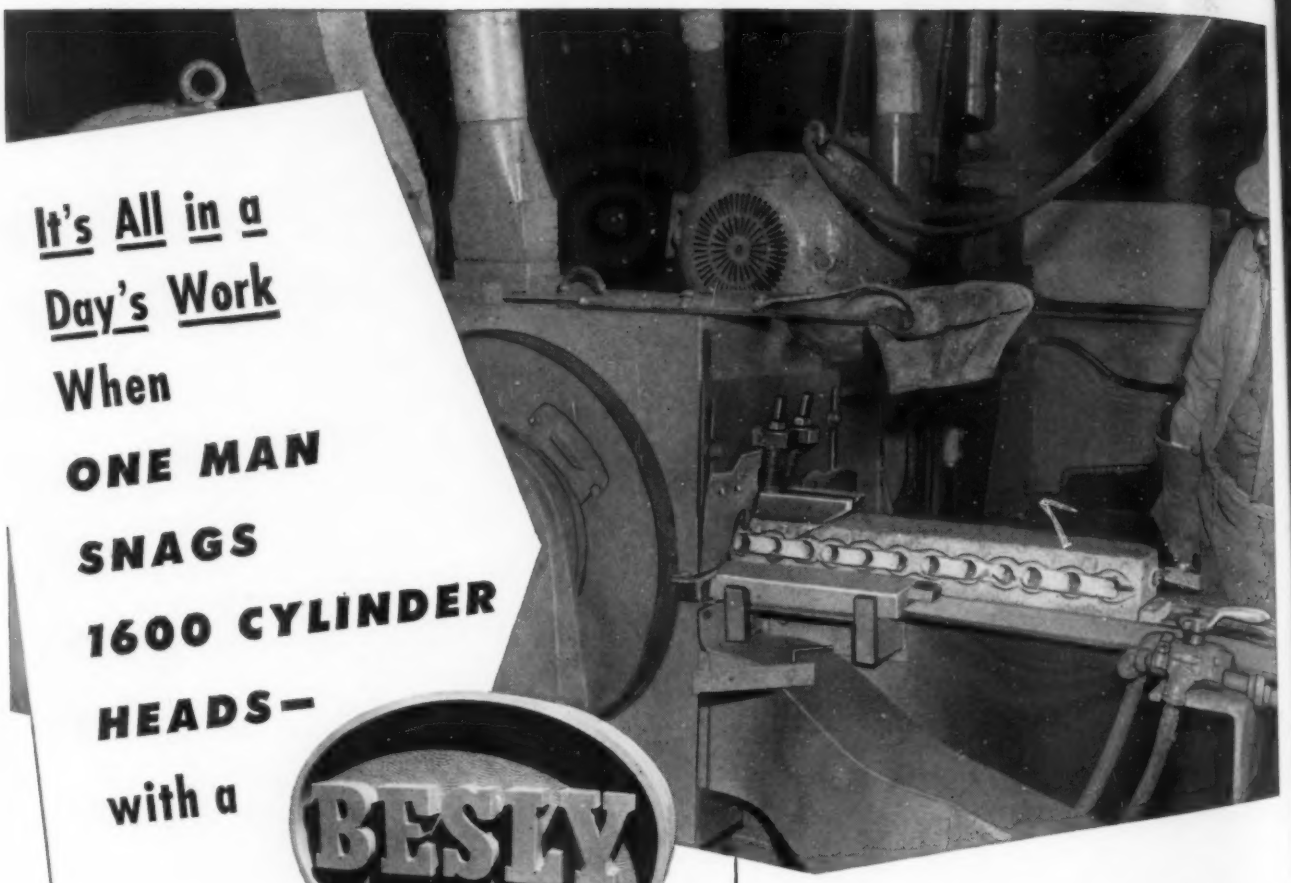
31-3200 West Davison Avenue • Detroit 6, Michigan

ESTABLISHED 1910

Offices in Principal U. S. Cities—Agents Throughout the World

WHEEL TRUEING TOOL COMPANY OF NEW JERSEY
33 West Street, Bloomfield, N. J.

WHEEL TRUEING TOOL COMPANY OF CANADA, LTD.
575 Langlois Ave., Windsor, Ont.



It's All in a Day's Work When ONE MAN SNAGS 1600 CYLINDER HEADS— with a BESLY GRINDER

A Man and a Grinder Replace a Crew of Hand Chippers to Avoid Holdups in Feeding Automobile Engine Production Line!

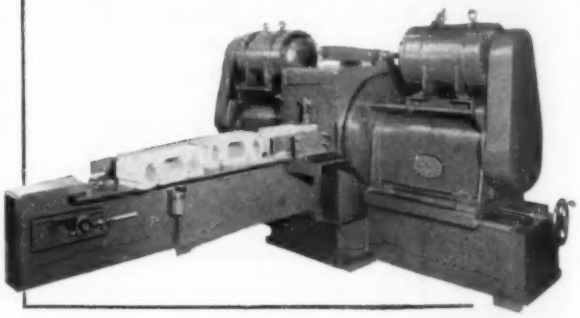
A Besly No. 630-30" Double Spindle Dry Grinder, attended by one man, now snags the fins from 1600 automotive cylinder head castings a day. Cast iron heads five to six inches thick, are conveyed hot from the foundry to the grinder operator who breaks off larger pieces of excess metal with a few hammer blows. The castings are then moved to a power-driven feeding fixture on the Besly Grinder, and fins 3/16 to 5/16-inch thick are ground off automatically *with a single pass,* producing clean, smooth, ready-to-machine castings.

It is production policy to meet the required cylinder head quota daily. With the Besly Grinder set-up, this manufacturer makes considerable savings in labor since a hand chipper crew is no longer required . . . and gets a better, more satisfactory job as well.

With changes in fixturing, the Besly No. 630 Grinder can be adapted to a wide variety of grinding operations, one of which may well speed and simplify your manufacturing process. Ask your Besly representative about this and other cost-cutting Besly Grinders for all needs!

ABOVE: No. 630-30" Besly Double Spindle Dry Grinder set up to grind cylinder head castings. Two 30" x 2" x 6" Besly-Titan Steelbac Abrasive Discs are driven through multiple vee-belt transmissions by two 25 HP, totally enclosed, fan-cooled, ball-bearing motors. Equipped with special exhaust hood and swinging arm wheel truing device. The continuous chain feeding fixture is motor driven through a worm and worm gear reducer. Special guide plates and spring-loaded hold down shoes accommodate the various castings.

BELOW: Besly No. 630 Grinder fixtured for smooth-surfacing tops and bottoms of concrete blocks.



BESLY-WELLES
CORPORATION

Established in 1875 as
CHARLES H. BESLY & CO.
118 Dearborn Ave., Beloit, Wis.

BESLY GRINDERS and ACCESSORIES • BESLY TAPS, DRILLS, REAMERS, END MILLS • BESLY-TITAN ABRASIVE WHEELS

HOW DO YOU PUT A HEAVY PHOSPHATE COATING ON 90 MM. SHELLS?

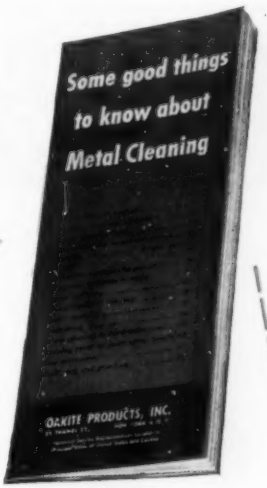
HOW CAN WE GET BETTER ELECTROCLEANING AT LOWER COST?

These are two of the simplest of the hundreds of metal-cleaning questions that come to us every day.

We answered our first metal-cleaning question for our first customer in 1909. Today we have 180 Oakite Technical Service Representatives answering metal-cleaning questions in the plants of thousands of customers in all the metal-working centers of the United States and Canada.

We thrive on these questions. They give us our daily work. The check list at the right shows the kind of jobs we do:

- ☐ Tank cleaning
- ☐ Machine cleaning
- ☐ Electrocleaning
- ☐ Pickling, deoxidizing
- ☐ Pre-paint treatment
- ☐ Paint stripping
- ☐ Steam-detergent cleaning
- ☐ Barrel cleaning
- ☐ Burnishing
- ☐ Rust prevention
- ☐ Treating wash water in paint spray booths
- ☐ Cooling and lubricating for machining and grinding



Please use the coupon to ask us your metal-cleaning question or to let us know of any other way in which we can help you.

OAKITE PRODUCTS, INC. 58 Rector St., New York 6, N. Y.

Tell me (without obligation) about Oakite methods for removing the following soils:

_____

_____

_____

Name _____

Company _____

Address _____

☐ ALSO send me a FREE copy of your booklet "*Some good things to know about Metal Cleaning.*"

SPECIALIZED INDUSTRIAL CLEANING

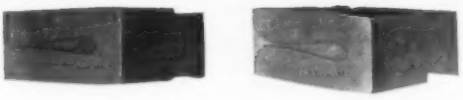
OAKITE

MATERIALS • METHODS • SERVICE

Technical Service Representatives Located in Principal Cities of United States and Canada

At the Metal Show—Visit Oakite Booth 2573

Pressure Blast Application #114



Before Pressure Blasting After Pressure Blasting

Hand finishing of this sterling silver fork die was reduced by 85% with Pressure Blast doing the primary finishing job. Heat treat scale was removed in seconds with absolutely no evidence of etching or stock removal. Not only is finishing time minimized but the work from this die is now smoother, cleaner and requires less subsequent finishing.



MODEL A . . . ONE OF 4 STANDARD UNITS. CUSTOM MACHINES DESIGNED TO FIT SPECIAL REQUIREMENTS.

ONLY PRESSURE BLAST GIVES YOU 2-SPEED WET-BLASTING

FREE . . . Learn what PRESSURE BLAST can do for you! Die and Mold Polishing, Blending Grind Lines, Deburring, Heat Treat Scale Removal, Honing of Cutting Tools, Pre-plating Cleaning . . . Hundreds of proven, money-saving applications!

Write for our new 8 page fully illustrated Booklet . . . or send samples of work you want tested to:

The CRO-PLATE Company Incorporated
747-9 Windsor Street
Hartford 5, Conn.

USE READER SERVICE CARD; INDICATE A-10-248-1

Simplify YOUR SET-UP JOBS



You can greatly simplify the making of set-ups for tapping and reaming if you use the holder that is especially designed for this purpose—the Ziegler Floating Tool Holder.

It enables you to make the set-up easier and faster because the work does not have to be aligned with the spindle as accurately as with ordinary tool holders. Just align the work to within 1/32" tolerance and you can leave it to the Ziegler Holder to do the rest.

Get a Ziegler Floating Holder and see for yourself how much time it saves. You'll be agreeably surprised too when you see how much it will cut your spoilage losses.

W. M. ZIEGLER TOOL COMPANY

13574 AUBURN DETROIT 23, MICH.

WRITE FOR CATALOG

Ziegler ROLLER DRIVE FLOATING HOLDER for Taps and Reamers...

USE READER SERVICE CARD; INDICATE A-10-248-3

KAUFMAN TAPPING MACHINES
BUILT FOR SPECIFIC PRODUCTION JOBS



THE MODEL A KAUFMAN TAPPER

Kaufman has specialized for many years in the building of tapping machines. Every machine is precision-built to meet the requirements of individual production jobs. Built with fully automatic cycle, single or multiple spindle heads and other most advanced features.

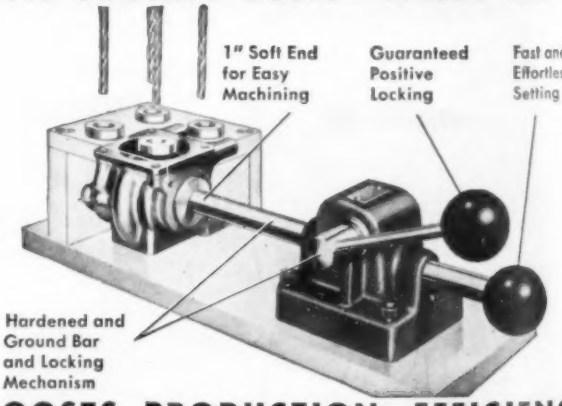
Send prints and sample of your work for further information and recommendations on how Kaufman Tapping Machines can reduce your production costs.

Catalog Number 1153 Mailed on Request

KAUFMAN MANUFACTURING COMPANY
553 South 29th Street
Manitowoc • Wisconsin

USE READER SERVICE CARD; INDICATE A-10-248-2

HEINRICH "GRIP-MASTER" FIXTURE LOCK
CUTS TOOLING COSTS—SPEEDS WORK



BOOSTS PRODUCTION, EFFICIENCY

Now—at the request of industry—we offer the new "Grip-Master" Screwless Fixture Lock, applicable for fixtures and jigs used in drilling, milling operations, etc. It incorporates the same high-quality locking mechanism proved by industrial use in the famous "Grip-Master" Screwless Drill Press Vise. Pays for itself quickly by increasing production, cutting tooling costs, etc. See your Dealer, or write for details.

heinrich TOOLS INC.
FORMERLY NATIONAL MACHINE TOOLS CO.

NEW CATALOG FREE

Be sure you have a complete Heinrich Tool Catalog in your files. Your copy will be sent free upon request.



DRILL PRESS VISES • FIXTURE LOCKS • NIBBLERS
PUNCHES • ROD CUTTERS
DEPT. 183-K • RACINE, WIS.

USE READER SERVICE CARD; INDICATE A-10-248-4

Du Quesne

Duquesne

Dukane

Here in the Pittsburgh district Duquesne is a great name. It identifies and lends distinction to outstanding landmarks and institutions.

Altered—for convenience—to Dukane, it identifies and lends distinction to "Pittsburgh's" outstanding grade of commercial drill rods . . . high carbon fine steel of gem-like precision and flawless finish.

In nearly 200 standard sizes, 2″ to 1/16″ round, Dukane is ideal for an almost limitless range of small cutting and wearing tools and precision parts. Wherever high standards of accuracy, uniformity, straightness and surface finish are indicated, no form of fine steel matches the economy, the adaptability or the serviceability of Dukane drill rods.

Order Dukane by name . . . from "Pittsburgh's" selected distributors coast to coast.

YOURS FOR THE ASKING

1—Descriptive price list.

2—Chart showing standard drill rod sizes, decimal equivalents, weight per foot and weight per 3-foot bar.

3—Catalog No. 6. Compact treatise on all grades of drill rod rounds and shapes, precision ground flats and squares, and other "Pittsburgh" prefinished steels . . . tables, illustrations, heat treating and other information of value to users of fine steels. Ask for it on your letterhead.

PITTSBURGH TOOL STEEL WIRE CO.

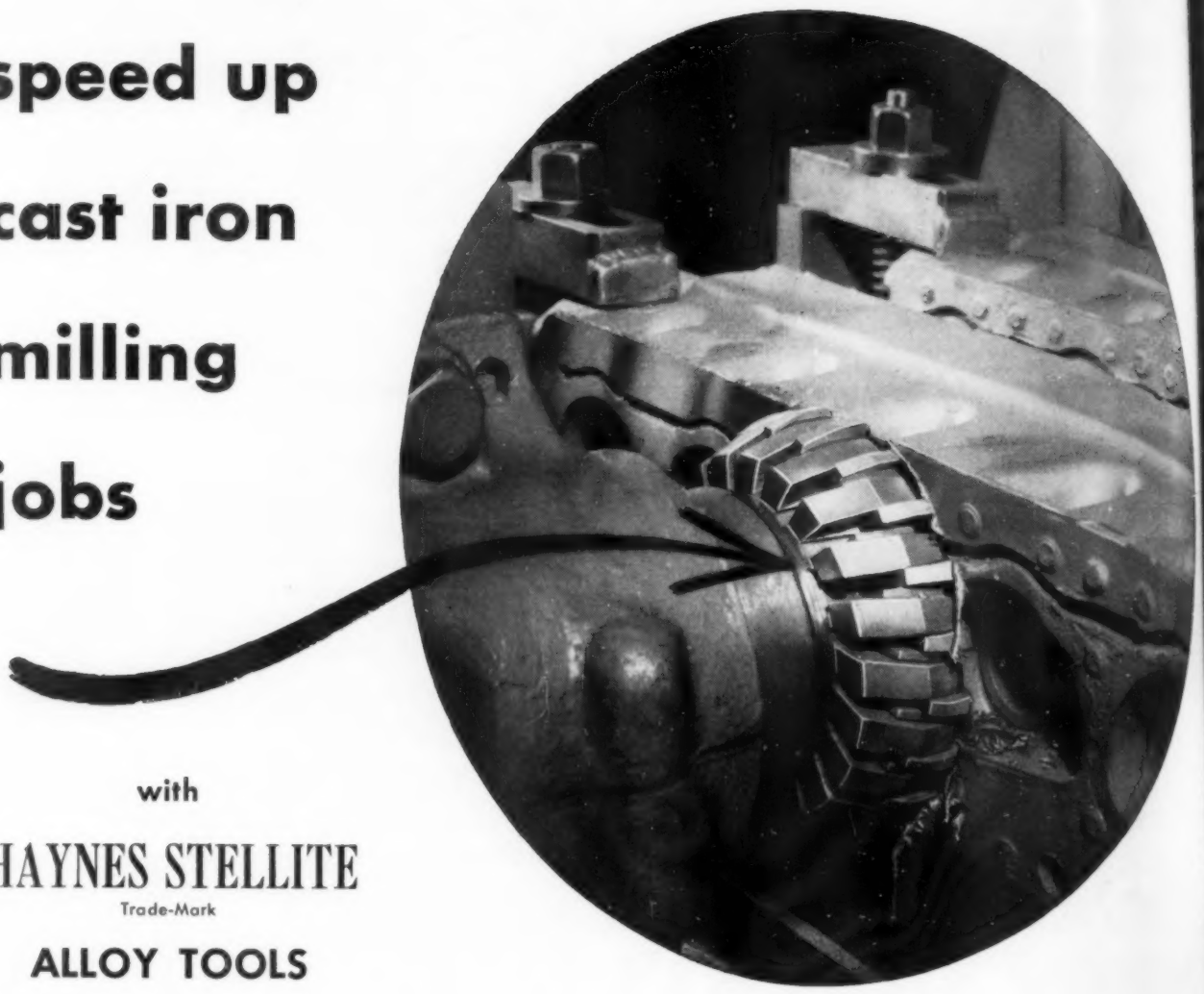
Since 1902 . . . makers of drill rods and other cold finished fine steel in all sizes, grades and shapes.

MONACA, PA.

*** FORT DU QUESNE**

Begun in 1754 by a party of Virginians who were soon driven away by the French and Indians . . . completed by the French and named Du Quesne. Burned by the French in 1758. Rebuilt by the English on a larger scale and named Fort Pitt. The blockhouse, then commanding the fort and the three rivers, is now an historical shrine commanding the rivers and the famed Gateway Center-Point Park project at the tip of Pittsburgh's Golden Triangle.

speed up cast iron milling jobs



with

HAYNES STELLITE
Trade-Mark

ALLOY TOOLS

High compressive strength at cutting temperatures . . . good impact strength . . . and extremely low frictional coefficients make HAYNES STELLITE alloys ideal tool materials for cast iron milling jobs.

Two hard grades of HAYNES STELLITE alloy are available for milling cast iron at high speeds. On soft cast iron (less than 185 Brinell), these tools can take light milling cuts at speeds up to 300 surface ft. per min. For heavy milling, speeds up to 250 surface ft. per min. can be used.

Hard cast iron up to 240 Brinell can be milled at speeds as high as 200 surface ft. per minute. Safe chip loads range up to 0.025 in. per tooth.

Tougher grades of HAYNES STELLITE alloy are available for efficient milling of castings that have irregular contours, surface imperfections, or inclusions, or where there are variations in chill depth.

HAYNES STELLITE alloy tools are available as fabricated shell-end mills and as insert milling-cutter blades. The different grades of alloy can be used for a wide variety of milling conditions. If you wish help on your own particular milling problems, write to the nearest Haynes Stellite Company office.

For a copy of the new manual, "HAYNES STELLITE Metal-Cutting Tools," write to our General Offices.

HAYNES TRADE-MARK *alloys*

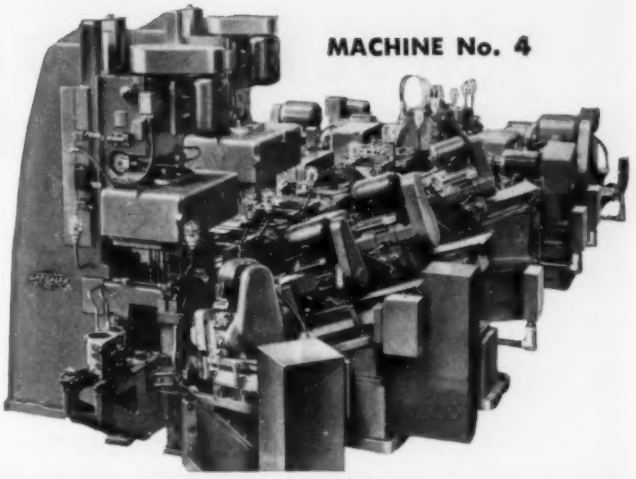
Haynes Stellite Company
A Division of
Union Carbide and Carbon Corporation
UCC
General Offices and Works, Kokomo, Indiana
Sales Offices
Chicago — Cleveland — Detroit — Houston
Los Angeles — New York — San Francisco — Tulsa

"Haynes" and "Haynes Stellite" are trade-marks of Union Carbide and Carbon Corporation.

208 OPERATIONS IN 44.3 SECONDS

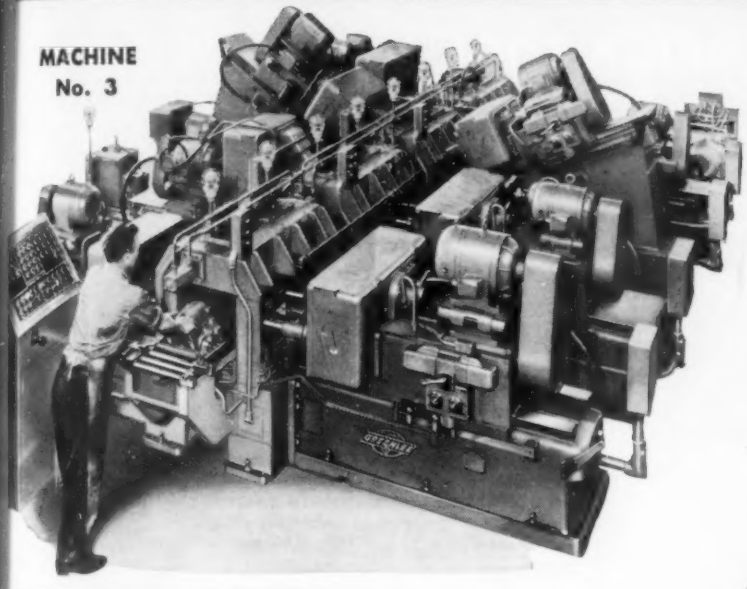
These recently-built Greenlee transfer machines mill, bore, drill, ream, and tap transmission cases for a well-known automobile. A total of 183 tools complete 208 operations in an automatic cycle time of 44.3 seconds. Features include face and end-milling heads, turnover and chip-cleanout stations, and indicator lights for tool changing. Self-contained hydraulic units conform to JIC standards for easy maintenance. These outstanding machines are among the newest built by Greenlee — a pioneer in progressive transfer-machine principles.

MACHINE No. 4



GREENLEE

MACHINE No. 3



TRANSFER MACHINES
PROCESS
AUTOMATIC
TRANSMISSION CASES
AT THE PRODUCTION RATE OF
65 CASES PER HOUR

MACHINE No. 2

MACHINE No. 1





PRODUCTION MACHINES
GREENLEE

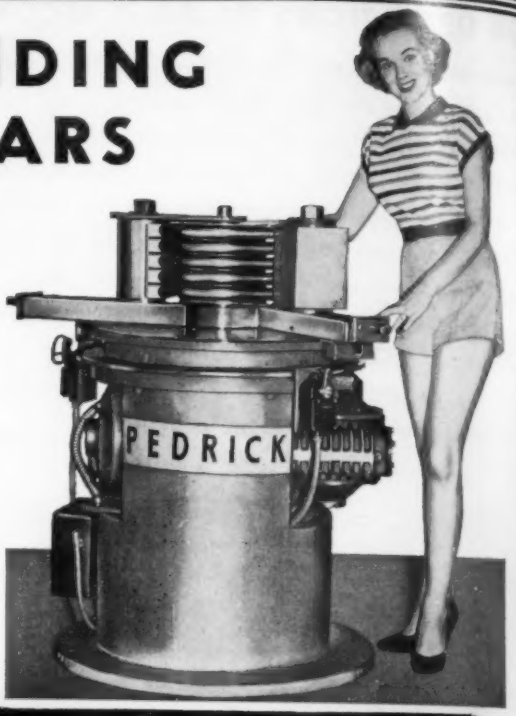
GREENLEE BROS. & CO.
1990 MASON AVENUE
ROCKFORD, ILLINOIS

MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

MULTIPLE BENDING SAVES DOLLARS

Here is a PEDRICK PRODUCTION BENDER producing five identical frames simultaneously. These savings can be your too with a PEDRICK BENDER. Multiple bending is adaptable to almost all bending operations including pipe, tube, reinforcing bars or structural shapes.

Smaller and larger machines available.

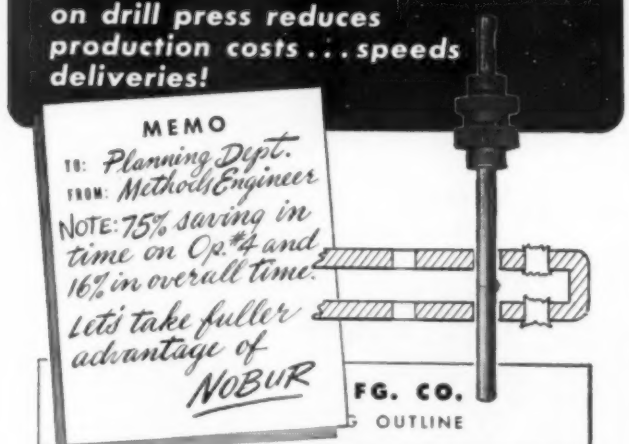


Write for Descriptive Folder. Dept. 12

PEDRICK TOOL & MACHINE CO.
3640 NORTH LAWRENCE ST.
PHILADELPHIA 40, PA., U. S. A.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-252-1

Deburring with NOBUR tool
on drill press reduces production costs . . . speeds deliveries!



OPER. NO.	MACHINE	DESCRIPTION	TIME
1	TURRET	BORE & FACE PER PRINT	5 MIN
2	MILL	STRADDLE MILL PER PRINT	3
3	DRILL	10 HOLES LINE DRILL	6
~~4~~	~~BENCH~~	~~DE-BURR HOLES~~	~~4~~
4 (REV.)	NOBUR TOOL IN DRILL PRESS	NOBUR HOLES	1
		TOTAL	~~18~~ 15

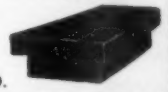
For further information, write or wire today
NOBUR MANUFACTURING COMPANY
717 NORTH VICTORY BLVD. • BURBANK, CALIFORNIA

USE READER SERVICE CARD; INDICATE A-10-252-2

COLLINS MICROFLAT
BLACK GRANITE SURFACE PLATES

Present an absolute continuous bearing surface, finished up to 50 millionths inch. Incredibly smooth. Falling objects do not cause humps. Being harder than hardened steel, can take greatest mistreatment without causing inaccuracy of surface. No oiling. Will not rust or warp. No re-scraping or frequent refinishing. Can use for spotting and "blueing in."

Immediate delivery in most sizes from 9x12 to 48x144. Request Bulletin and name of Distributor nearest you.



COLLINS MICROFLAT CO.
2326 E. 8th Street Los Angeles 21, Calif.

USE READER SERVICE CARD; INDICATE A-10-252-3

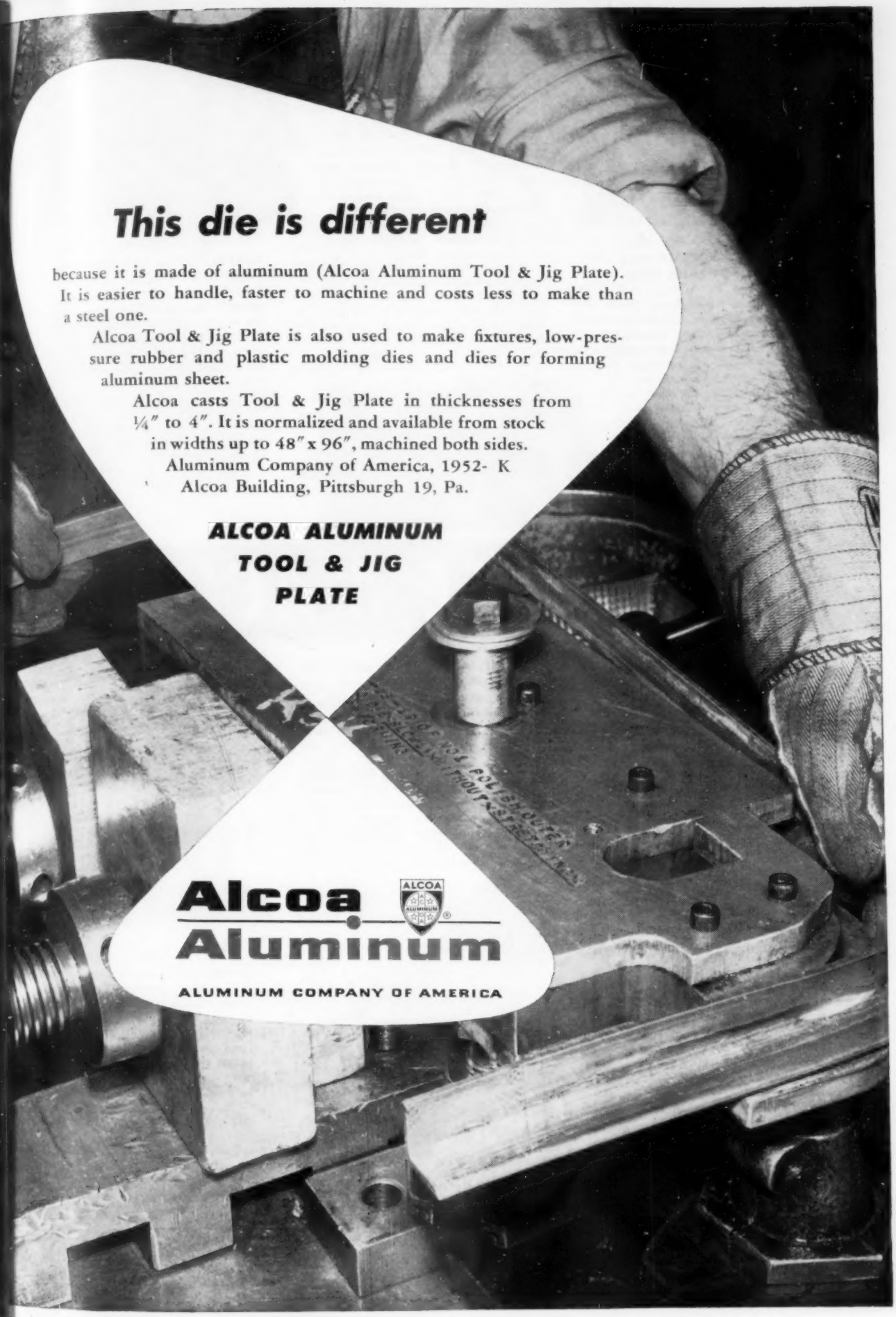
WHO*



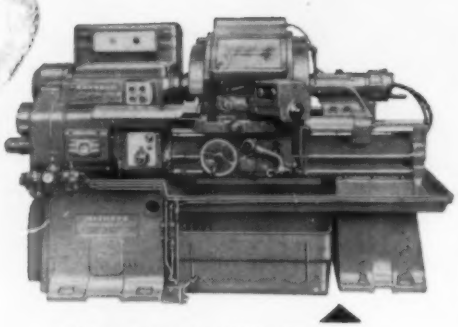
makes the finest in
CAP SCREWS • SET SCREWS • MILLED STUDS
and COUPLING BOLTS

*Wm. H. Ottemiller Co.
YORK, PENNA.

USE READER SERVICE CARD; INDICATE A-10-252-4



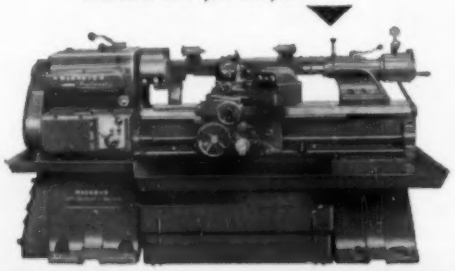
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-253

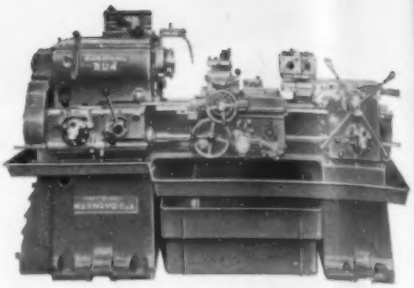


MAXNOVO MODEL A AUTOMATIC CYCLE "PROFILMATIC" DUPLICATING LATHE. 17" swing over ways, 4½" over cross slide with 20", 30" or 40" center distance. This machine is equipped with air chuck and air tailstock to provide a completely automatic cycle with 2 or 3 automatic spindle speed changes and 6 or 12 automatic feed changes. Automatic speed and feed changes are accomplished by an automatic cycle control bar which is pre-set to operate precision micro-switches at any point of the operating cycle. Copies from master template mounted at rear of machine out of the way of chips and coolant. 12½ or 15 H.P. drive. This machine can be furnished with complete tooling to produce parts in accordance with your blueprint.

The entire line of Maxnovo machines is manufactured by one of Europe's most advanced manufacturers in this line. These machines can be furnished with many types of special attachments and tools too numerous to describe here.

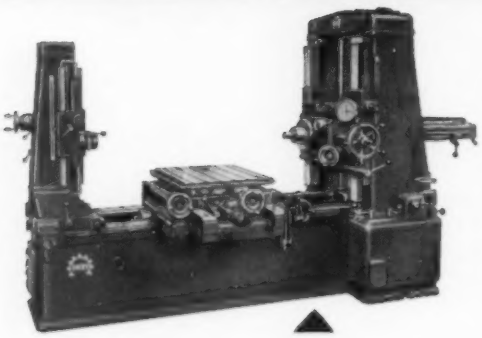
MAXNOVO MODEL U UNIVERSAL "PROFILMATIC" DUPLICATING LATHE. Swing over ways 17". Maximum turning dia. over cross slide 4". Distance between centers 30", 40", or 50". 6 or 12 spindle speeds from 75-1400 R.P.M. This machine duplicates automatically from either a sample work piece or from a flat template. The sensitive electro hydraulic tracing unit duplicates within extremely close tolerances. The duplicating slide can be locked out to permit use of the machine as a conventional lathe. 8 or 12 H.P. motor drive. This machine can be furnished complete with tooling to machine parts in accordance with your blueprints.





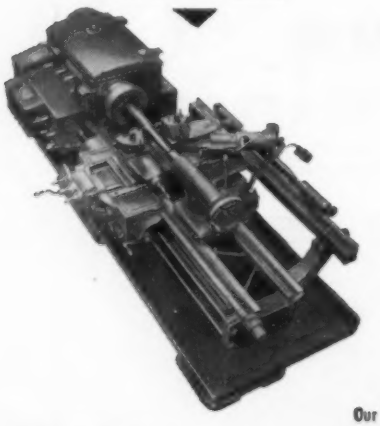
MAXNOVO MODEL RU 4 UNIVERSAL TURRET LATHE. Swing over bed 16-9/16". Swing over cross slide 9⅞" Capacity through spindle 2". Maximum distance spindle nose to face of turret 29½". Spindle speeds 64-1200 R.P.M. 8 power feeds to carriage .002"-.024" per rev. and 32 power feeds to turret .0005"-.048". 8 or 12 H.P. motor drive. Machine can be furnished with air chuck, collet chuck, or bar feed attachment. The hexagon turret faces are machined and tapped to American standards and will accept standard turret tools of leading American manufacturers of this type of machine.

SEE THESE MACHINES I



DIXI 60 COMBINATION HORIZONTAL BORING MILL AND JIG BORER WITH OPTICAL MICROSCOPES. Headstock, column, table settings accomplished by optical microscopes to insure overall accuracy of .0002". Built in rotary table also equipped with optical microscope for accurate angular settings. Table size 28¾" x 32⅛". Maximum distance table to spindle 19.7". Table travel longitudinal and traverse – 23⅜". Hydraulic feeds for all functions 0- 78" per min. #40 mm Taper spindle. Spindle travel 24.4". Spindle speeds 32-1350 R.P.M. Spindle feeds .0015"-.010" per rev.

SCHAERER MODEL UN-450 HEAVY DUTY COPYING LATHES. Twin cross slides. Copies from cylindrical or flat template either longitudinally or cross. Twin slides permits rough turning and finish turning in the same operation in many instances. Swings 17¾" over bed, 9" over carriage, 20-5/64" over gap. Center distance 60". Spindle speeds 31.5 to 1400 R.P.M. Hydraulic copying attachment can be removed to permit use as a regular twin slide lathe when necessary. 10 H.P. motor drive to spindle. Separate motors for coolant and hydraulic pick up. A production lathe built to tool room standards.





GIRARDS RADIAL DRILLS. Seven Sizes from 3' arm x 11¾" column to 10' arm x 25½" column. 3' and 4' arm machines have 12 spindle speeds from 32-1400 R.P.M. and 6 feeds from .0015" to .040" with #4MT Spindles. Larger machines have 21 spindle speeds from 14-1400 R.P.M. and 12 feeds from .0008" to .080" with #5MT Spindle and 7.5 H.P. Spindle Motor.

Our headquarters in New York City



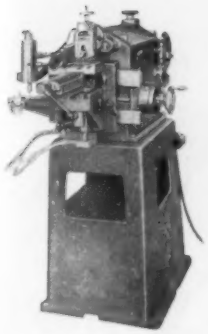
Exclusive representatives in the United States

M. B. I. EXPORT & IMPORT LTD.

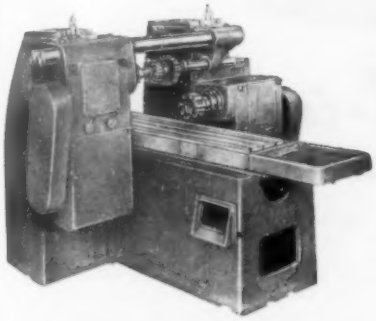
475 GRAND CONCOURSE • BRONX 51, NEW YORK

CABLE ADDRESS: MACHBUILD, NEW YORK

MBI

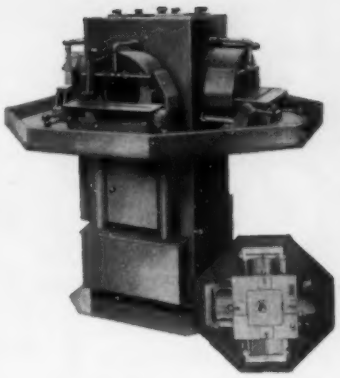


BARTSCH HYDRAULIC COPYING SHAPER. 8" Stroke, 8½" cross travel, 6" vertical travel. Ram speed infinitely variable 0-65 ft. per min. Copies any shape from template at 1:1 ratio. Automatic table feed. Stroke length adjustable. Indexing vise permits shaping work between centers. 2 H.P. motor drive.

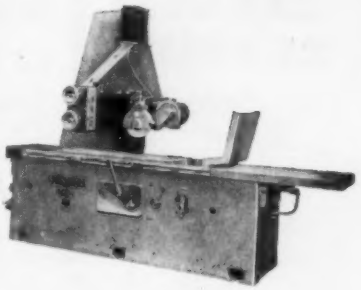


OLIVETTI MODEL FP4 PRODUCTION TYPE MILLING MACHINES. Available with 20", 40", or 72" Table Travel in **simplex, duplex,** and **triplex** machines. Machines arranged for conventional or climb milling. Cutter spindle motors up to 10 H.P. Machines heavily constructed for production work. Automatic work cycle permits rapid advance, feed, and rapid return. Table width 12". 13 feeds to 32" per min. Rapid traverse 173" per min. 12 spindle speeds 63 - 800 R.P.M.

QUART CARBIDE TOOL GRINDER. 4 working positions. Three 12" silicon carbide cup wheels and one 14" straight wheel. Individual direct motor drive and separate control switch for each working position. Wheel speed 1750 R. P. M. Provision for diamond dressing tool at each working position. MODEL TRIAX (not shown) same as above, but with 3 cup wheels and 3 working positions only.



SCHNEIDER HYDRAULIC UNIVERSAL HORIZONTAL SURFACE GRINDING MACHINE TYPE JoH2. Grinding spindle adjustable through any angle from 0° to 90°. MODEL JoH1, 24" x 10" Table, 18" Under Wheel. MODEL JoH2, 48" x 16" Table, 22" Under Wheel. MODEL JoH3, 60" x 20" Table, 22" Under Wheel. Table feed infinitely variable 0-50 ft. per min. Traverse feed infinitely variable 0-.600".



S IN ACTUAL OPERATION

at Booth 1412 National Metal Exhibition October 19 to 23

Modern machine tools, built by reputable, old established European machine tool builders to the highest standards of **quality, accuracy, rigidity and performance.** Distributed exclusively in the United States by M.B.I. for over 25 years manufacturers of precision products.

- *Guaranteed service by Trained Staff*
- *Spare Parts in Stock*
- *Early Deliveries—Some from Stock*
- *Your Operators Trained*
- *Competitive Prices*
- *Financing & Rental Plans to Meet Your Requirements*
- *Engineering Staff will make recommendations based on your drawings*

MBI

SEND FOR YOUR
FREE COPY
NEW ACME BUSHING CATALOG

Contains America's LARGEST BUSHING Selection

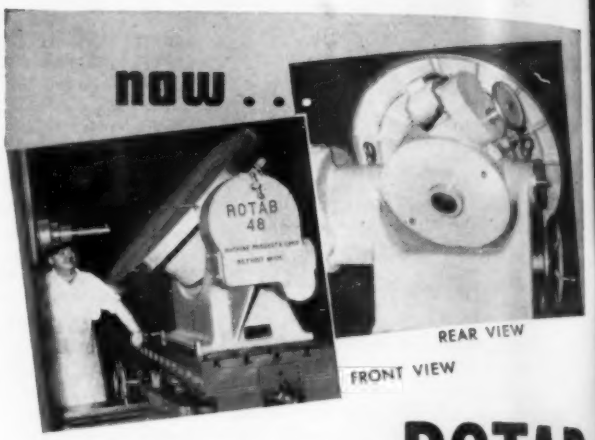
Features 2 Standards
A.S.A. Standard *Plus* Acme Standard

Makes Bushing Procurement Easy... Fast! Send For Your FREE Copy Now!

Simplifies, speeds bushing selection. Packed with valuable data. Saves you time and trouble. Also includes liners, leader pins, dowel pins, locating jigs, etc.

ACME INDUSTRIAL COMPANY
208 N. Laflin St., Chicago 7, Illinois
Serving Industry For 28 Years
MANUFACTURERS OF DRILL JIG AND FIXTURE BUSHINGS
USE READER SERVICE CARD, INDICATE A-10-256-1

now . . .



REAR VIEW
FRONT VIEW

A 48-inch ROTAB
with motor-driven table for fast and easy positioning of work

Now a giant ROTAB!—to give you an extra sized table (48-inch) with benefit of motor-drive to position work fast and easily. The table, with 8 tee slots for clamping work, can be rotated by push of button, and locked to any degree to precision accuracy within 2 min. by vernier graduations. Can also be set from vertical to 30° below horizontal the opposite way. Has one shot lubrication.

The 36-inch model also available with motor drive. Smaller models—12" and 24"—are set manually.

MACHINE PRODUCTS CORPORATION
6771 E. McNichols Rd. Dept. G Detroit 12, Mich.
USE READER SERVICE CARD; INDICATE A-10-256-3



Made to your Order...
FULLER
Cutting Tools
SPECIAL, HIGH-PRECISION
HIGH-SPEED STEEL & CARBIDE TIPPED



FULLER TOOL CO.
4000 WEST ELEVEN MILE RD.
BERKLEY, MICH. LINCOLN 2-5600
USE READER SERVICE CARD; INDICATE A-10-256-2

CUT TOOL COSTS
broken tools made like new again with NU-TANGS

Twisted or broken tangs replaced at low costs on any tool with a Morse Taper (sizes 1 to 6) Hundreds of leading industries save money on drills, reamers, countersinks, cutters, drivers, the NU-TANG way. Prompt delivery. Send for prices—or send tools for repair. All work guaranteed.

NO WELDING! NO SLEEVES!
NO SHORTENING! NO DISTORTION!

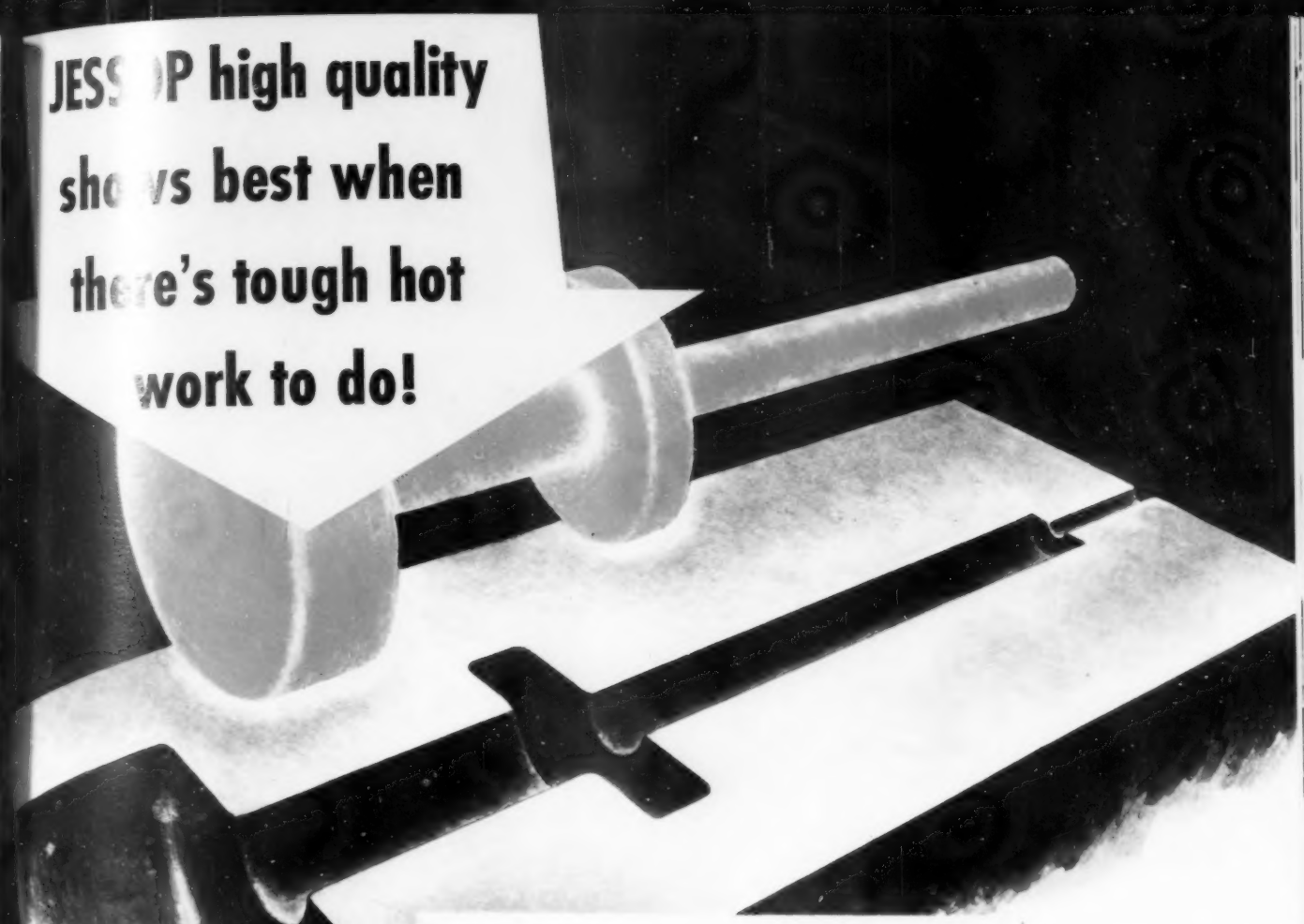
Send them to us like this! GUARANTEED STRONG AS NEW! *We return them like this!*

* Patent No. 2,512,033 NU-TANGS INC. 1337 Bates Avenue Cincinnati 25, Ohio
USE READER SERVICE CARD; INDICATE A-10-256-4

TO OBTAIN FURTHER INFORMATION ABOUT ADVERTISERS, TRADE LITERATURE OR TOOLS OF TODAY APPEARING IN THIS ISSUE OF THE TOOL ENGINEER, USE THE HANDY READERS SERVICE CARD ON PAGE 105.

Modern Machine Tools

JESSOP high quality shows best when there's tough hot work to do!



Of all the many types and shapes of steel that make Jessop America's most diversified specialty steel house, none shows its quality in the clinches better than the DICA-B brand hot work steel illustrated here in the form of a die. Jessop is justly proud of this steel because its high quality is easy to measure. For example, if you make dies, knives, punches or tools for any type of die-casting, forming, punching, cutting or extruding of hot ferrous or nonferrous metals, Jessop has a steel for you. Jessop has a carefully controlled analysis to give you extra toughness to resist shock, or extra hardness to withstand abrasion, or extra ability to resist temperature change without checking or cracking—or any combination of these virtues. And beyond matchless quality, the fast, efficient service of the Jessop team will please you no end. To find this out very quickly, send us an order for any of the specialty steels listed here.

STAINLESS STEELS
HIGH SPEED STEELS
NON-MAGNETIC STEELS
HIGH SPEED TOOL BITS
HEAT RESISTING STEELS
STAINLESS-CLAD PLATES
CARBON AND ALLOY STEELS
TOOL STEELS FOR SPECIAL PURPOSES
CAST-TO-SHAPE TOOL STEELS
HIGH SPEED AND ALLOY SAW STEELS
TEMPERED AND GROUND STRIP STEEL
COMPOSITE HIGH SPEED STEELS
STAINLESS AND HEAT RESISTING CASTINGS
COMPOSITE DIE STEEL SECTIONS
PRECISION GROUND FLAT STOCK
DIE STEELS— HOT AND COLD WORK

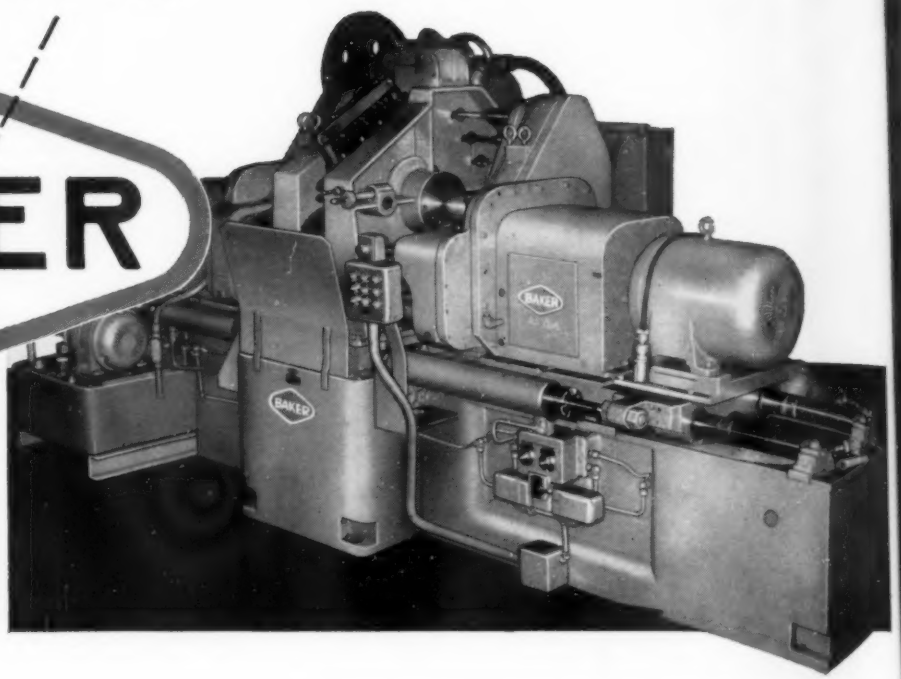
JESSOP

STEEL COMPANY • WASHINGTON, PA.

Modern Machine Tools..

SLASH PRODUCTION COSTS!

New
BAKER
Method



1 Operator . . .
1 Machine . . .

Multi-Operations Fully Automatic On 4 Parts Simultaneously—Load—Drill—Core Drill—Ream—Unload

THE OLD METHOD—



2 OPERATORS . . 4 MACHINES . .

Hand Controls + Excessive Handling + Capstan And Hand Engagement Of Feed + Operator Fatigue = Low Production Rate At High Cost.

INCREASE PRODUCTIVITY..
with a NEW BAKER 'Special'

WRITE REGARDING YOUR SPECIFIC JOB PROBLEMS...

BAKER BROTHERS, INC. Toledo, Ohio
DRILLING...TAPPING...KEYSEATING and CONTOUR GRINDING MACHINES



Super Constellation by Lockheed

LINDBERG STEEL TREATING HELPS KEEP YOUR EARS FROM ACHING

MELROSE PARK, ILL.
(Chicago)
1977 North Ruby
MOnroe 6-3308

ROCHESTER, N. Y.
620 Buffalo Rd.
GEnessee 5212

ST. LOUIS
650 E. Taylor
Fireside 6200

LOS ANGELES
2910 So. Sunol Drive
ANgelus 9-7311

Remember the days of the "airplane ear-ache"? . . the kind caused by low cabin pressure when your plane or airliner flew above 8,000 or 10,000 feet? Well, fortunately, "airplane ear-aches" are pretty much a thing of the past now . . particularly on today's high altitude airliners.

Airlines, always alert to anything that will make passengers more comfortable, called for equipment that would keep cabin pressures normal . . so passengers wouldn't be bothered with ear-aches.

The result was the *cabin pressurization compressor* . . one of the important parts of which is a little impeller wheel. It looks simple . . but it isn't. Some of the country's better engineers spent quite a few years working on it.

Each impeller wheel, after it is machined, has to be heat treated. Engineers of AiResearch Manufacturing Company who developed the wheel (and the compressor) demanded absolutely the correct heat treatment . . for each one represented a great deal of expense, time and effort.

*It was a job for Lindberg Steel Treating Company!** Lindberg heat treating specialists determined precisely the correct method of heat treating . . the required heating temperature . . and exactly the right quenching procedure.

Aircraft inspection standards required that each wheel be inspected, not at one, not at two, not at three . . but at *four* distinct specified locations for proper hardness. No impeller wheel left the Lindberg plant without being certified by serial number. Not a single thing was taken for granted.

If you demand the ultimate in heat treating . . if you insist that nothing be taken for granted . . call Lindberg.

**Lindberg Steel Treating Company heat treats the impeller wheels for one of AiResearch's suppliers, Masterform Tool Company, Chicago.*

A case history of Lindberg Steel Treating Co. service to American industry

LINDBERG STEEL TREATING CO.

1977 North Ruby Street, Melrose Park (Chicago), Illinois Phone: MOnroe 6-3308

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-259



Faster Automatic Polishing, with fewer adjustments, are "Touch of Gold" advantages assured by ALUNDUM abrasive.

Give your polishing the cost-cutting "TOUCH of GOLD"

...with ALUNDUM* abrasive on your set-up wheels

Here are two big advantages that Norton ALUNDUM abrasive bring to your polishing:

Uniformity Careful processing control of Norton ALUNDUM abrasive assures that grains are uniform in size, structure and chemical composition. No oversize grains to mar surfaces — no flats, slivers or undersized grains that loaf on the job. Instead, you get a full quota of tough, sharp, equal-sized grains that stand up under severest conditions — each one doing its share of fast-cutting, uniform polishing.

High Capillary Action Norton ALUNDUM abrasive is specially treated to raise its capillarity, so that each grain soaks up glue easily and thoroughly. As a result, each grain is held as firmly as its neighbor — giving a strong, long-lasting, top-performing polishing wheel.

In Your Automatic Polishing advantages like the above are particularly important. With each ALUNDUM grain doing an equal share of the work, and each one tightly fixed to the wheel, you can be sure of top-quality polishing with minimum adjusting. That's the product-improving, time-saving "TOUCH OF GOLD" that will build *your* profits on *every* polishing job, from roughing to finishing!

See Your Norton Distributor for quick delivery of ALUNDUM polishing abrasive in the types, sizes, and surface treatments you need. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed in your telephone directory yellow pages under "Grinding Wheels." *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

G-261

NORTON
ABRASIVES

Making better products... to make other products better

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

IT'S NEW... # lo-jet acro*



the revolutionary new coolant system that . . .

keeps cutting tool and work at room temperatures!

lo-jet acro's *proven results in America's leading industries are making production history, from coast to coast!*

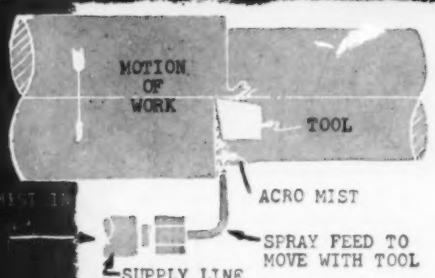
* Controlled compressed air operation for all types of metal cutting with special ACRO-COOLANT soluble solution.

Pictured here is the 8⅛" outlet centrifugal equalizer distributor with 8 copper tube spray feed. This assembly serves 8 cutting operations.

lo-jet acro

- prolongs tool life
- cuts tool breakage loss
- saves money
- speeds production
- keeps work clean

there is a lo-jet acro *system for every purpose and every machine.*



write now for more information at no obligation.

Our engineering staff will cooperate free of charge.

lo-jet acro *is a product of*

AIR CONVERSION RESEARCH
CORPORATION
4107 North Damen Avenue • Chicago 18, Ill.

Air Conversion Research Corp.
4107 N. Damen Ave. M
Chicago 18, Ill.

Gentlemen: Please send me full information about **lo-jet acro's** coolant system.

name and title_____

firm_____

address_____

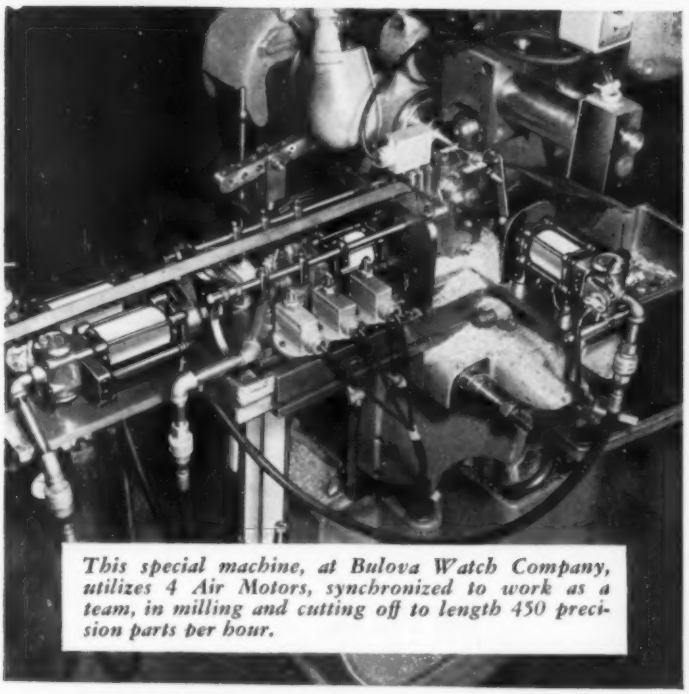
city and zone_____ state_____

TOLEDO, OHIO

"PACKAGED" POWER UNITS SIMPLIFY DESIGN OF COST-CUTTING TOOL-ROOM-BUILT SPECIAL MACHINES



The combination of two Bellows Drill Press Feeds and a Rotary Work Feeder cut cost of drilling and tapping a cast iron ring from 33-6/10c to 7-3/10c at HOTPOINT, INC.



This special machine, at Bulova Watch Company, utilizes 4 Air Motors, synchronized to work as a team, in milling and cutting off to length 450 precision parts per hour.

Your design engineers know the principle and value of "close-coupling-control" used in Bellows Air Motors and Bellows "packaged" pneumatic devices to provide fool-proof electrical interlock of hydraulically controlled pneumatic circuits — but here's what it means in terms of lower cost production in your plant:

1. It makes it possible for you to convert manually operated standard machines and machine tools to fast automatic or semi-automatic machines.
2. It makes construction in your own tool room of high speed single purpose machines so inexpensive that you can afford special machinery for even short run operations.

Bellows "packaged" pneumatic devices are complete power units which provide hydraulically controlled air-powered linear motions of unparalleled smoothness at a fraction of the cost of complex cams and gearings. They are easily interlocked electrically with themselves or with other related machine elements.

What do they accomplish? They provide an auxiliary source of power to feed tools to parts (or parts to tools), to clamp and hold parts, to eject parts; to operate clutches, and brakes; to raise and lower work tables; to open and close fixtures, collets, valves, doors; to perform virtually any repetitive pull, push or lift motion.

In the last twelve years, these versatile units have established amazing records of production accomplishments in thousands of manufacturing plants in all lines of industry. Production gains ranging from 50% to 500% in such operations as drilling, milling, threading, tapping, honing, grinding, lathe turning, etc., are everyday experiences.

Your production executives will be interested in the possible application of Bellows Air Motors and Bellows "packaged" Controlled-Air-Power Devices to your production processes. Write, or have them write, for the new booklet "Faster, Safer, Better Production." Or better yet, have them talk to one of our field engineers. We maintain a staff of some 100 Field Engineers in the United States and Canada. These men know production. They are skilled in the use of air power. They are at your service without cost or obligation. Your local Field Engineer is listed in the phone book under "The Bellows Co." Call him.



If you would like a copy of this new Free Booklet — write Today. Ask for Bulletin CL-50. Address Dept. TE-1053. *The Bellows Co., Akron, Ohio.*

In Canada — Bellows Pneumatic Devices of Canada, Ltd., Toronto, Ontario.

The Bellows Co.

Akron 9, Ohio



we are expanding our facilities to bring you...

more "Desegatized"® steel— faster!

In order to improve our service to tool steel users, we have expanded our warehousing facilities since October, 1950, by erecting a new warehouse at Los Angeles to serve the West Coast . . . moving from downtown Chicago to a new, larger warehouse in suburban Melrose Park, Illinois . . . replacing our Detroit warehouse with improved location and facilities at Centerline, Michigan . . . adding to warehouse at Hartford to nearly double its capacity . . . enlarging warehouse and shipping facilities at Latrobe.

and now—we are moving our New York district sales office to a new office and warehouse at Hillside, New Jersey. Just south of Newark, this location is ideally suited to serve our many customers in northern New Jersey, greater New York and the Hudson River valley.

A growing fleet of Company-operated trucks brings plants east of the Mississippi River within a one or two day delivery cycle from our warehouses or our manufacturing facilities at Latrobe, Pennsylvania.

LATROBE STEEL COMPANY

LATROBE, PENNSYLVANIA

SOLE PRODUCERS OF "DESEGATIZED" STEELS

BRANCH OFFICES AND WAREHOUSES

BOSTON BUFFALO CHICAGO CLEVELAND DAYTON DETROIT HARTFORD HILLSIDE, N. J.
LOS ANGELES MILWAUKEE PHILADELPHIA PITTSBURGH ST. LOUIS TOLEDO

EUROPEAN OFFICES IN

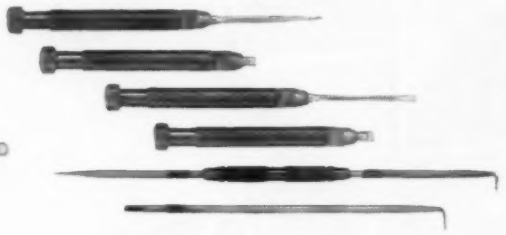
GENEVA PARIS BRUSSELS ROTTERDAM MILAN

TUMICO

Precision Made Hand Tools





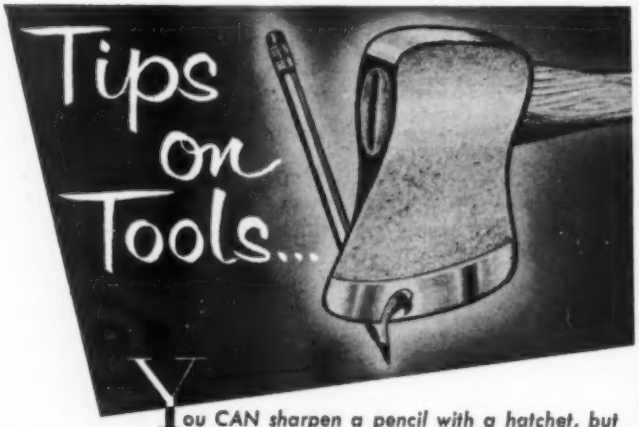
● Tumico calipers, dividers, scribers, etc., are made to satisfy the craftsmen who demand precision quality in all tools. These instruments are made with the same care and to the same standards as Tumico micrometers.

WRITE FOR CATALOG showing complete line of Tumico micrometers, dial indicators, gages, all types of precision measuring instruments.



TUBULAR MICROMETER CO., BOX 80, ST. JAMES, MINN.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-264-1



You CAN sharpen a pencil with a hatchet, but a pencil sharpener is the best tool for the job. THERE IS ONE DIAMOND TOOL THAT IS BEST FOR YOUR JOB.

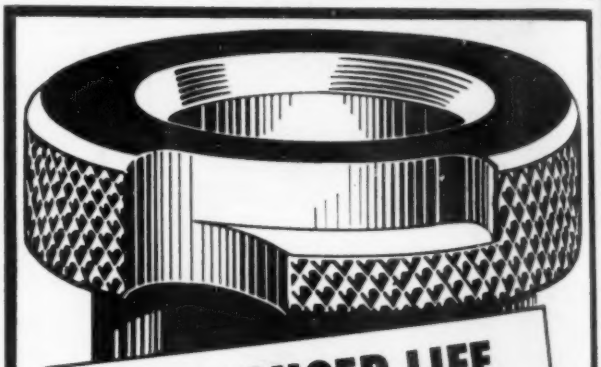
If there is room for improvement in your use of diamond in any form — wheels, tools, hones, powder, compound or loose stones, DTR, the diamond specialists are equipped to bring a profitable solution to your problem.

Our catalogs are free, our representatives at your disposal. Please write today.

WHEELS TOOLS COMPOUNDS POWDERS HONES LOOSE DIAMONDS

DTR DIAMOND TOOL RESEARCH CO., Inc.
305 East 45th Street New York 17, N. Y.
MUrray Hill 4—0466-7-8

USE READER SERVICE CARD; INDICATE A-10-264-2



GET LONGER LIFE
with exclusive Colonial #3 steel drill jig bushings
Ask for handy "Flip-a-page" Catalog (B-649) and prices
COLONIAL BUSHINGS, Inc.
31780 Groesbeck Highway • Fraser, Michigan

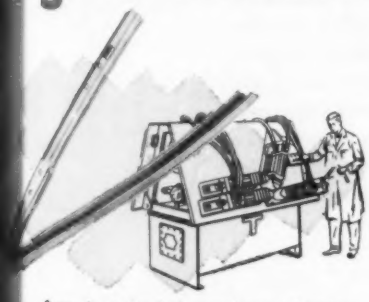
COLONIAL
DRILL JIG BUSHINGS

USE READER SERVICE CARD; INDICATE A-10-264-3



There are lots of ways to PIERCE METALS

But here's High Production Piercing in a single set-up



Seven irregular holes and two trimming operations complete this car door inner window frame in one setup. Model changes can be made at low cost.

DANLY HYDRAULIC METALWORKING EQUIPMENT

Now you can pierce multiple holes of practically any type—round, oblong or irregular—to very close tolerances in a single setup. Capacity of Danly Metalworking Equipment can be as high as 225 tons per hole with break-through shock practically eliminated. Each station hydraulically strips its punch, greatly simplifying fixturing. Custom-built for your piece part, Danly Hydraulic Metalworking Equipment enables you to pierce more holes faster and more accurately—in one operation.
Write for the special bulletin shown at right today.



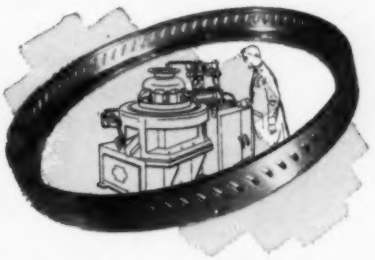
DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue, Chicago 50, Illinois



More than 40 holes in this automotive frame member are pierced simultaneously on a Danly machine built expressly for this purpose.

DANLY®

HYDRAULIC METALWORKING EQUIPMENT
MECHANICAL PRESSES
... 50 TO 3000 TONS



Irregularly shaped holes are pierced in this stainless steel jet engine part to very close tolerances—automatically.

"...Well done, AMERICA"



GEORGE M. HUMPHREY
Secretary of the Treasury

"Few things in America contribute more importantly to national security than the Payroll Savings Plan—the vehicle through which millions of employed men and women build security, counteract inflation and create a reserve of future purchasing power by their monthly investment in U. S. Savings Bonds. Credit for this outstanding influence in our lives is due largely to a team that is typically American... far-sighted business executives who have made the Payroll Savings Plan available to the employees of 45,000 companies... 8,000,000 Payroll Savers... publishers of more than 500 business magazines and the management of the other advertising media who contribute generously of their space and time... the Advertising Council and advertising agencies who give freely of their skills. To these and to all who have a part in building the Payroll Savings Plan, the U. S. Treasury Department welcomes this opportunity to say, "Well done, America."

Do you know—

• on May 1, 1953, the cash value of Series E Bonds outstanding—the kind bought by Payroll Savers—reached a new record high—$35.5 billion—$1 billion more than the value of E Bonds held on May 1, 1951, when E Bonds commenced to mature.

• cash sales of Savings Bonds, all series, during the first four months of 1953 totaled $1,741,273,000—22% above those of the first four months of 1952.

• of the approximately $6.7 billion E Bonds which had come due up to the end of April, 1953, $5.1 billion, or 75% were retained by their owners beyond maturity.

• every month, nearly 8,000,000 Payroll Savers purchase about $160,000,000 in Series E Bonds.

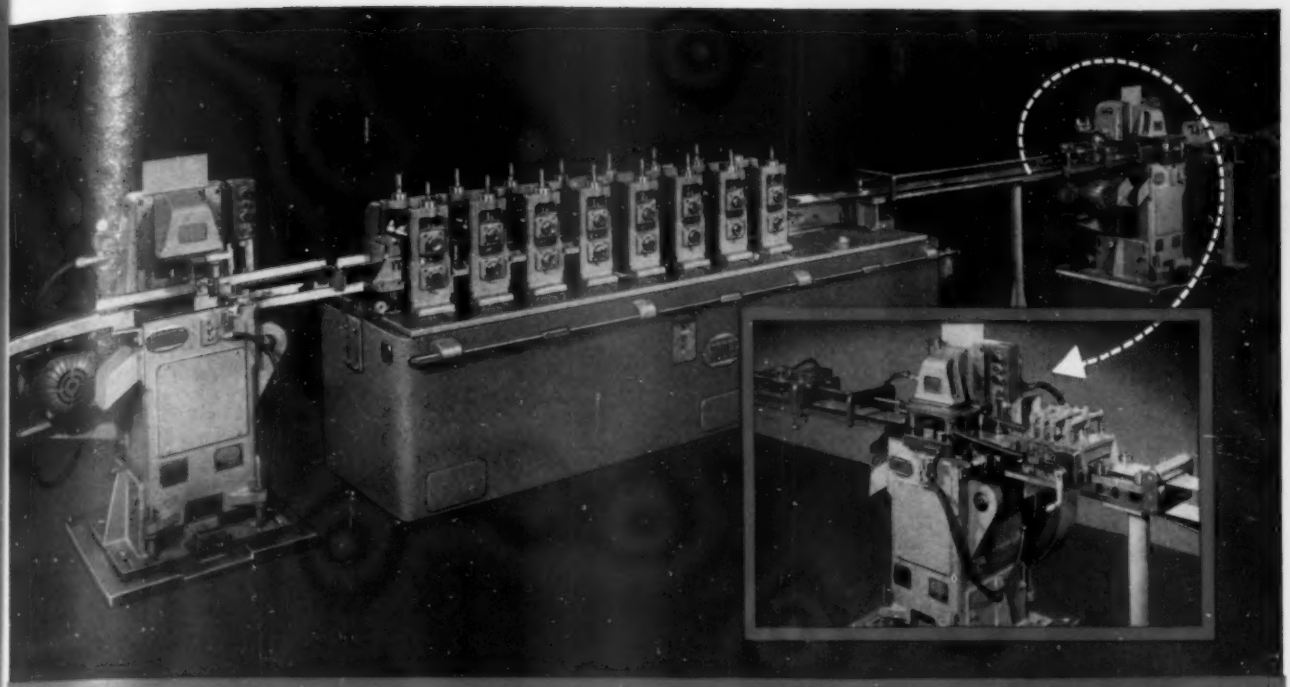
For assistance in installing a Payroll Savings Plan, or building participation in an existing Plan, write to Savings Bond Division, U. S. Treasury Department, Suite 700, Washington Building, Washington, D. C.

The United States Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the Advertising Council and

AMERICAN SOCIETY OF TOOL ENGINEERS
10700 Puritan Avenue **Detroit 21, Michigan**

built expressly for this purpose.

MECHANICAL PRESSES
... 50 TO 3000 TONS



COLD-ROLL-FORMING

Multi-Function Production Lines *engineered to fit your needs*

The continuous feeding of coiled strip into a Yoder Cold-Roll-Forming machine is the fastest, most accurate and economical method yet devised for converting flat rolled metal into a multitude of finished shapes.

For still greater economy other operations may be combined with cold forming, such as embossing, notching, punching, perforating and cutting-to-length, coiling etc., often without adding a single penny to the labor or handling cost.

Some of these operations can be done by means of special tooling in the roll forming machine itself, others by auxiliary units lined up with it. Shown above is a line consisting of: (1) a Yoder Automatic Press for notching or perforating the strip before it goes into the forming machine, (2) the forming machine, and (3) another Yoder Press for automatic cut-off. The finished pieces from this line are then ready for assembly into window louvres or jalousies.

The know-how of the Yoder engineering staff is at your service in designing such multi-function production lines to meet individual requirements. Tell us about your needs. Yoder Book on Cold-Roll-Forming and auxiliary operations sent on request.

THE YODER COMPANY • 5525 Walworth Ave., Cleveland 2, Ohio

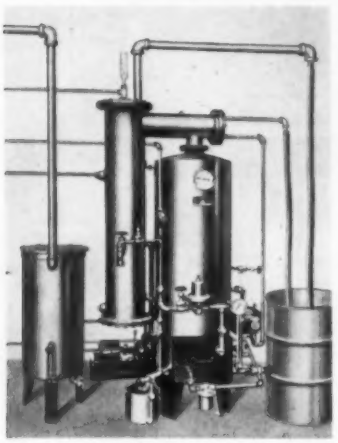
Complete Production Lines

- ★ COLD-ROLL-FORMING and auxiliary machinery
- ★ GANG SLITTING LINES for Coils and Sheets
- ★ PIPE and TUBE MILLS–cold forming and welding

ENGINEERING YODER MANUFACTURING

McCulloch Motors Corp. saved $3,330 *in one year!*

RECLAIMING WASHING SOLVENT with a HOFFMAN VACUUM STILL



McCulloch Motors Corp., Los Angeles, Calif., manufacturer of motor-driven chain saws, uses an average of 600 gallons of solvent every week to wash and degrease parts and machinery.

After use, the solvent which cost over fifteen cents a gallon, was sold for a salvage price of two cents a gallon.

To reclaim their solvent and to prevent such a weekly profit loss, a Hoffman Industrial Vacuum Still was installed. Operating only one day a week with little maintenance or attention, the still reconditioned a week's supply of solvent and pumped it to a storage tank for re-use.

The HOFFMAN STILL paid for itself in only 9 months!

BEFORE STILL WAS IN OPERATION

Solvent Cost	$.157 per gallon
Salvage Price	.02 per gallon
Net Cost . .	$.137 per gallon

600 gallons used weekly
600 x 50 = 30,000 gallons per year
30,000 x $.137 = $4,110.00 annual cost

AFTER STILL WAS IN OPERATION

Operating Cost . . .	$.017 per gallon
Solvent Loss (7%) . .	.01 per gallon
Net Cost . .	.027 per gallon

30,000 gallons x $.027 = $810.00

THE RESULTS

$4,110.00 – $810.00 = **$3,300 Saved**

Write today for additional information. Let Hoffman engineers show you how to reclaim your washing solvents and duplicate the cost savings of McCulloch Motors.

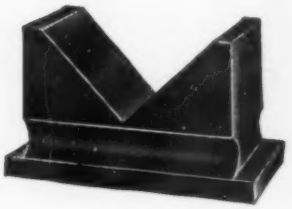
TOPS IN VALUE SINCE 1905
Hoffman
INDUSTRIAL FILTRATION EQUIPMENT & SERVICE
U. S. HOFFMAN MACHINERY CORP., 227 LAMSON STREET, SYRACUSE 6, N. Y.
In Canada: Canadian Hoffman Machinery Co., Ltd., Newmarket, Ont.

USE READER SERVICE CARD; INDICATE A-10-268-1

SEMI-PRECISION "V" BLOCKS
for all-round shop use

Sturdily designed for hard-usage . . . Accurately machined from close-grain iron . . . Ideal for drill presses, milling machines, shapers and planers. Will test round shafting for straightness.

Economically priced.

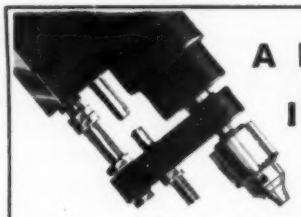


NO.	BASE	HEIGHT	THICK-NESS	ACROSS TOP	CAP.	NET PRICE
10	4½" x 3"	2⅝"	3"	3½"	3½" dia.	$ 7.50
11	6½" x 4"	4"	4"	5½"	6" dia.	$15.00

Write for descriptive bulletin.

ACME TOOL COMPANY
75 W. BROADWAY • NEW YORK 7, N. Y.

USE READER SERVICE CARD; INDICATE A-10-268-2



A NEW CONCEPT IN AIR-POWERED DRILL UNITS FROM CHUCK TO SPINDLE

Day by day, the Alkon air feed hydraulic control drill unit is setting new standards for low-cost drilling, reaming, countersinking and counterboring.

Alkon's small over all dimensions . . . only 16" x 3¾" x 1-15/16" . . . and its universal positioning, permit unlimited set up arrangements.

plus

- Quick approach
- Controlled feed
- Rapid return





Don't delay! Investigate today! Write for catalogue, specifications and prices.

ALKON *products corporation*
698 EAST 142nd ST. • NEW YORK 54, N. Y.

USE READER SERVICE CARD; INDICATE A-10-268-3

Tool Steel Topics

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

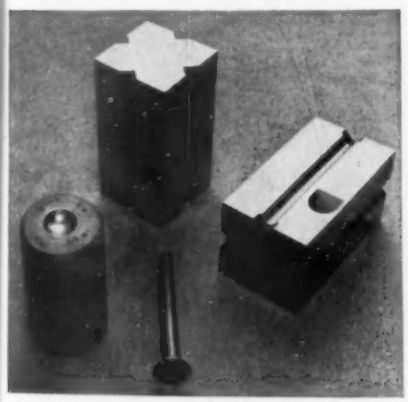
PENCIL SLIPPED . . . DIES BROKE

One of our customers reported his cold-heading dies were cracking and spalling. The spalled areas appeared to be the result of the hard case upsetting into the softer core.

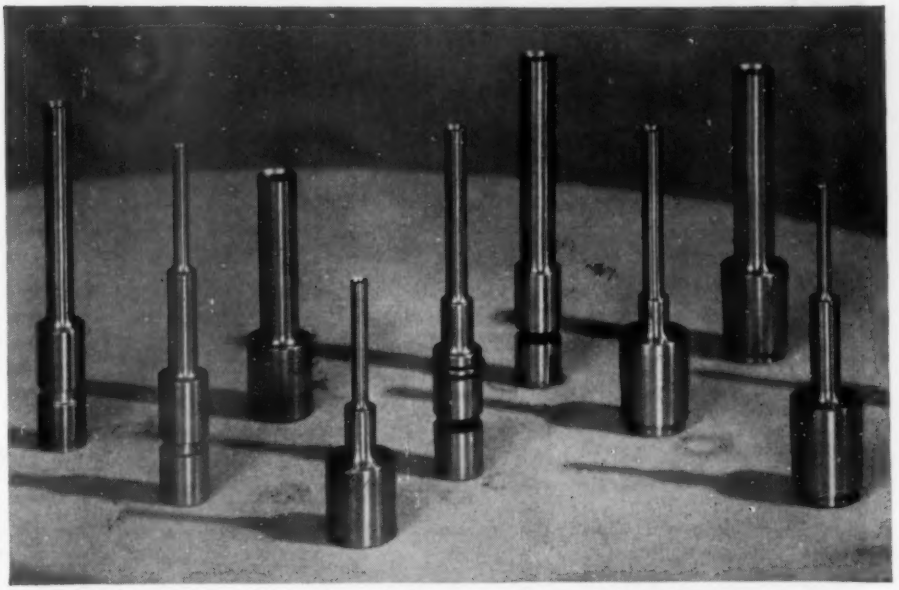
Our metallurgical contact man who visited the customer's plant couldn't find anything out of order, until he happened to read over an order the customer had entered for the steel. Then the light began to dawn.

The answer? The customer had failed to specify "cold-heading die quality" on the order. There's quite a difference between ordering "carbon tool steel" and "cold-heading die quality steel."

It's the difference between a tool steel that's processed for doing a fine job on severe cold-heading and steel that just isn't suitable for this type of special application.



The gripper and header dies shown above, made of Bethlehem XX Cold-Heading Die Steel, have the right combination of hard surface and tough core for cold-heading thousands of steel bolts each day.



"Even the roughest kind of service in binderies and printshops won't break paper drills when they're made of Omega tool steel," says William Gynther of Bent and Gynther, Portland, Ore.

OMEGA HELPS TO STOP BREAKAGE OF PAPER DRILLS

Drilling holes through paper may sound easy, but it isn't. Printers who do much paper-drilling will tell you that the drills often break and bend.

The other day we were given quite a fill-in on the subject by William Gynther, one of the owners of Bent and Gynther, Portland, Ore., suppliers of drills to the printing trade. Mr. Gynther told how he once noticed four broken drills on the desk of a prospective buyer. He made a wager that *his* drills wouldn't break, even though this printshop apparently gave the drills pretty severe treatment. The printer took him up—and hasn't broken a drill in some years.

The success of the "B and G" drills is attributed by Mr. Gynther to the unique taper inside the drill and to the grade of tool steel (Bethlehem's Omega). Omega is our silico-manganese grade of shock-resisting steel, and while it is intended mainly for cold-battering tools where terrific shock must be absorbed, it appears to have the ideal hardening properties for these paper drills, together with plenty of the toughness required to withstand stress and strain.



BETHLEHEM TOOL STEEL ENGINEER SAYS:

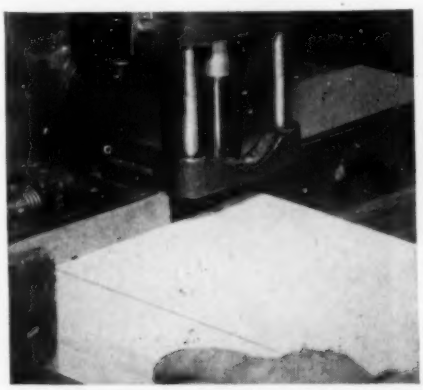
Always temper immediately after hardening

It's always risky to delay or to omit tempering immediately after a hardened tool cools following the quench. With a liquid-quenched steel always get the tool into the tempering furnace as soon as it cools down to about 150 to 200 F; an air-hardening steel should cool to 150 F.

Some heat-treaters spit on a tool—if there's no sizzle, it's cool enough to temper. You can also use a contact pyrometer or other indicators to get a more accurate check on the temperature of freshly quenched tools.

If you delay the temper—to check hardness or for some other reason—you're running the risk of permitting stresses to build up. And these stresses may crack the tool in half, even before it reaches the tempering furnace. Of course, such failures don't always occur if this precaution is ignored.

Some people just can't be convinced that it's risky to delay tempering after the tool cools following the quench. But there's no way to predict just when it may happen, so why take the risk?



Boring holes through a stack of paper doesn't sound like a tough job, but there's a lot of stress on these hollow drills which causes frequent breakage—unless they're made of the right steel.

Simplex

PRECISION BORING MACHINES



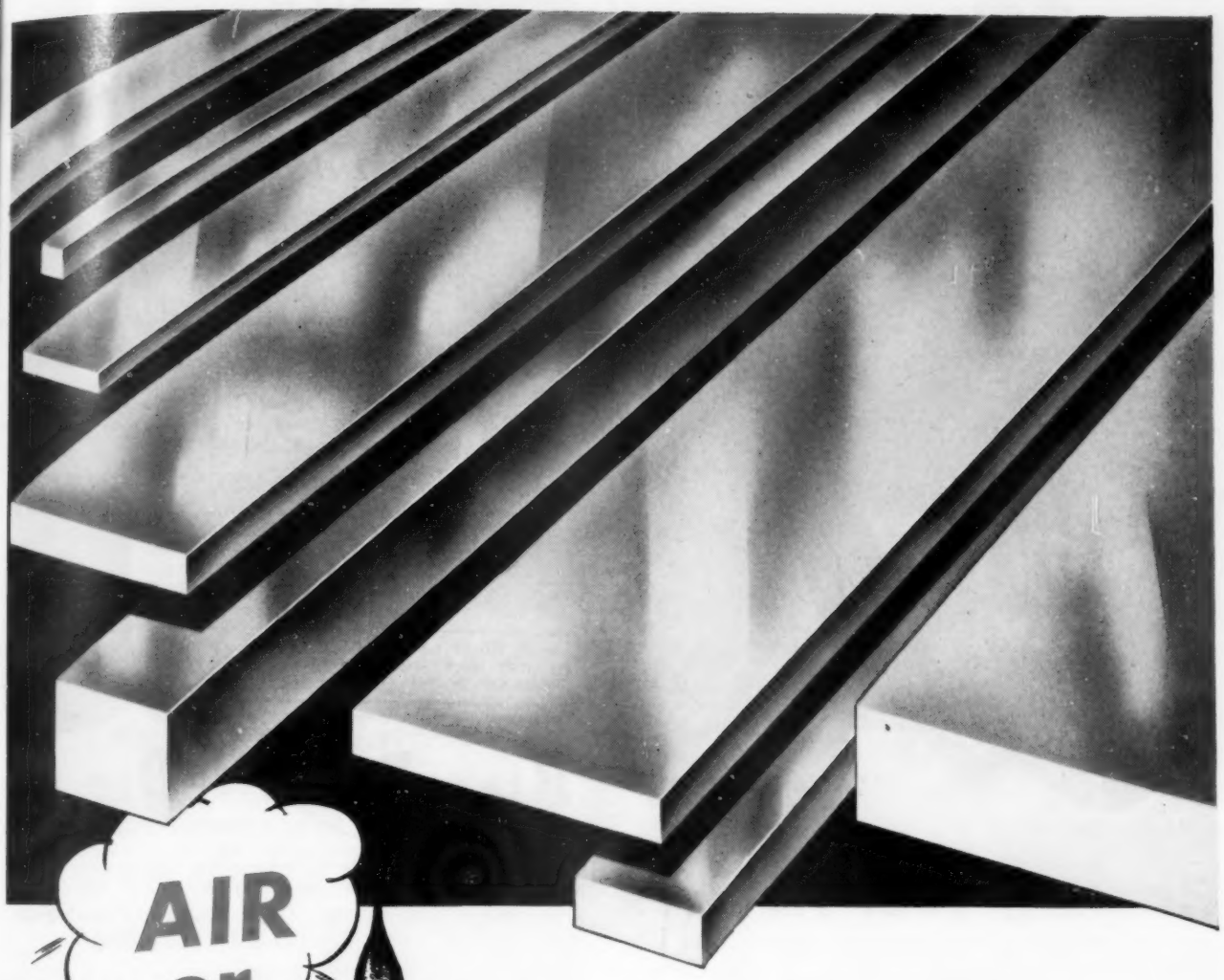
SIMPLEX #1 Standard Single End Mechanical Feed Precision Boring Machine with two #1 SIMPLEX self-contained automatically lubricated Precision Boring Heads. Other sizes of Mechanical and Unit Type Hydraulic machines also available.

SIMPLEX MACHINE TOOL CORPORATION

4528 WEST MITCHELL STREET

MILWAUKEE, WISCONSIN

PRECISION BORING MACHINES • PLANER TYPE MILLING MACHINES • SPECIAL MACHINE TOOLS



AIR or OIL HARDENING?... which DIE STEEL is best for you?

For punches and dies that produce up to 50% more pieces per sharpening — use *Simonds Air Hardening Die Steel.* 5% chrome content makes this non-deforming steel more wear-resistant. Better for punching or cutting silicon or stainless steels, Monel metal, or other abrasive metal. Spheroidize annealed for good machinability, it also has a wide hardening range (1700° to 1800°F). Stock sizes from ½″ to 2″ thick, and 2″ to 10″ wide in 36″ lengths.

For standard die, jig, punch, gage and small tool applications, *Simonds Oil Hardening Flat Ground Die Steel* is a valuable time and money saver. Made of non-deforming molybdenum type die steel, it is uniformly annealed for easy machining and uniform hardening. Due to its wide hardening range (1450° to 1540°F) good results are assured with even the simplest heat treating equipment. Stock sizes available from 1/64″ to 3″ thick and ⅛″ to 14″ wide in 18″ lengths. Heavier sizes also furnished in 36″ lengths.

Your Simonds Distributor stocks many sizes of both types . . . individually packaged with simple heat treating instructions. Call him for complete details.

SIMONDS
SAW AND STEEL CO.
FITCHBURG, MASS.

Factory Branches in Boston, Chicago, San Francisco and Portland, Oregon. Canadian Factory in Montreal, Que.
Simonds Divisions: Simonds Steel Mill, Lockport, N. Y., Simonds Abrasive Co., Phila., Pa. and Arvida, Que., Canada



Floating Tool Holders

No fine adjustments necessary. These holders correct misalignment to 1/32" radius AS THEY TURN. And they produce perfect work even on worn machines. They've been saving set-up time and tool change time on screw machines, drill presses and lathes for over 30 years. Are you using them fully in all departments? It might pay to check!

For complete specifications on styles and sizes send for Data Folder J.

Utility Tools

THE J. C. **GLENZER** CO., Inc.
1552 E. NINE MILE ROAD, DETROIT 20, MICH.

USE READER SERVICE CARD; INDICATE A-10-272-1



RING PUNCHES

•

HARD...
tough...
concentric...

Precision-made of both Carbon Vanadium and high carbon, high chrome steels. Available in a wide range of stock sizes from 1/32" to 1" point diameters in increments of 1/64" for immediate delivery. Decimal sizes to order for delivery within 48 hrs.

Button Dies
Ring Type or Press Fit

Hole tapered to eliminate slug jamming. Sizes in stock to match punch sizes.



Write TODAY for your copy of handy data sheets covering specifications and prices; also name of distributor in your area.

Exclusive distributor wanted for the states of Washington and Texas.

Ring Punch & Die Co.

108 FOOTE AVE., JAMESTOWN, N. Y.
USE READER SERVICE CARD; INDICATE A-10-272-2

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★



Mod. No. 6 Universal Type for Cutter, Cylindrical and Surface Grinders.

For Cooler, Check-Free Grinding

USE NEWMAN DRESSERS

Models for every type of wheel dressing. Proven best for dressing diamond wheels. Replacement wheels available for all models.

See Your Dealer or Write to

L. NEWMAN
1001 24th STREET
OAKLAND, CALIF.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

USE READER SERVICE CARD; INDICATE A-10-272-3

Severance Regrinding Service

☆ HIGH SPEED and CARBIDE ☆

CONSERVE STRATEGIC MATERIAL!



WE REGRIND: MIDGET MILLS, COUNTER SINKS, END MILLS, MILLING CUTTERS, PINKING CUTTERS ETC.
START USING THIS MONEY SAVING SERVICE NOW!

Severance Tool Industries Inc.

728 IOWA AVE., SAGINAW, MICHIGAN
USE READER SERVICE CARD; INDICATE A-10-272-4



Announcing...

a new service from Ampco

AMPCO* METAL

Grade 24 Die Blanks!

now available from stock

. . . the dies for forming and drawing stainless steels that give longer runs, reduce scrap, cut your costs.

This is good news for everyone who makes drawn or formed stainless parts. Now you can get immediate delivery on 70 sizes of solid rounds, rectangles, and centrifugally-cast rings *at new low* prices for your stainless drawing, forming, or bending operations.

Die blanks of Grade 24 Ampco Metal have become so popular that commonly used sizes are now available promptly from Milwaukee stock. Types and sizes include:

34 sizes of solid rectangular pieces from ½″x1″x12½″ to a maximum of 4″x4″x12½″.

27 sizes of centrifugally cast blanks from 4″ OD x 1″ ID x 1½″ thick up to 20″ OD x 12½″ ID x 2″ thick.

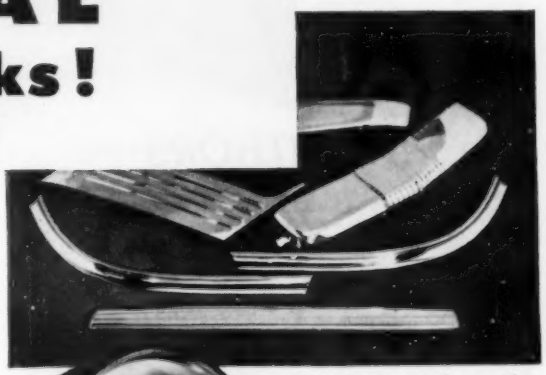
11 sizes of solid rounds up to 5″ OD x 12½″ long.

The popularity and wide acceptance of this special alloy for forming or drawing stainless or similar materials is due to these advantages — advantages you get only with Ampco Grade 24:

1. **Your usual scrap losses are minimized** because Ampco grade 24 dies are non-galling, non-loading.

2. **Less time is required for finishing operations** . . . your costs are cut. Grade 24's unique bearing qualities and low co-efficient of friction eliminate scratches and die marks on surface of pieces drawn.

3. **You get longer runs** without redressings caused by pickup, *longer die life, reduced downtime.* This remarkable alloy gives a die life 3 to 5 times greater than other bronzes and many times that of conventional steel dies.



Polished stainless steel auto trim formed over Ampco Metal, Grade 24



Stainless steel kitchen utensils and wash machine tub produced on Grade 24 dies

Don't wait any longer to enjoy low-cost, trouble-free production of drawn metal parts. If you draw, form, perform roll forming, or reduce tubes or similar sections — if you use stainless, pickled-carbon steel, silver, zinc, lead, or Inconel or Monel metals — Ampco Grade 24 is just right for you. Send the coupon today for complete information and prices.

AMPCO METAL, INC.

MILWAUKEE 46, WISCONSIN

West Coast Plant, Burbank, California

*Reg. U. S. Pat. Off.

D-19

MAIL THIS COUPON TODAY

AMPCO METAL, INC., Dept. TE-10, Milwaukee 46, Wis.

Please send me a copy of Ampco Grade 24 stock die folder at no obligation.

Name.....Title.....

Company.....

Company Address.....

City.....(.....) State.....

Still THE STANDARD reference in the tool engineering field

Produced
FOR TOOL ENGINEERS—BY TOOL ENGINEERS
at a cost of over a quarter million dollars



2087 PAGES WITH OVER 2000 CHARTS, TABLES AND DRAWINGS

COMPREHENSIVE: Covers every activity in which the tool engineer makes or influences a decision.

PROFESSIONALLY ARRANGED: Data written to give you the whole picture—not from a point-of-view associated with a single machine, product, or operation.

AUTHORITATIVE: Prepared by distinguished contributors and reviewers in the field. Data based upon ASA and other established standards. All material thoroughly checked for accuracy.

MODERN: Emphasizes new, vital data not yet brought together in a single handbook.

UNBIASED: Data incorporated strictly on its merits.

HELPFUL TO ALL IN THE FIELD: In addition to the strict technique of tool engineering, contains a wealth of data needed by general executives, designers, and those who sell to or serve the manufacturing industries.

TIME-SAVING: Gathers together in one volume the definitions, symbols, equations, tables, charts and procedures usually found only in a variety of scattered sources.

THE AUTHORS

It is impossible here to give a complete list of all the 245 authors and editors—and the thousands of collaborators who contributed without recognition. Among them are specialists from:

50 Manufacturers in Various Industries
Such as John Fredericks, Chevrolet Gear & Axle O. T. Hamby, Dodge Brothers; R. S. Kegg of Allison Division, GM; Donald Pickles, Ford Motor Co.; Walter Wagner, Lincoln; P. C. Booty, International Harvester; H. G. Meibuhr, Thompson Products; W. L. Smith, Butler Mfg.; E. N. Sorensen, Nash-Kelvinator; C. H. Borneman and 18 others of various General Electric plants; Joseph Manuele and 7 other department heads in Westinghouse; R. A. Wagner, Consolidated-Vultee; etc.

11 Technical Societies & Publications
Like John Gaillard, A.S.A.; S. C. Massari, Am. Foundrymen's Association; S. L. Hoyt of Battelle Memorial Institute; R. E. Wareham, Am. Soc. for Quality Control; the editors of American Machinist, Machinery, Tool Engineer, etc.

35 Universities, Consulting Engineers, etc.
Like O. W. Boston of Un. of Mich.; E rle Buckingham of MIT; G. L. Kehl of Columbia; C. W. Besserer of Johns Hopkins Applied Physics Lab.; Waldemar Naujoks of Girard Associates G. J. Stegemerten of Methods Engrg. Council; etc.

51 Machine Tool Manufacturers
Like Hans Ernst, Cincinnati Milling; E. P. Blanchard of Bullard; E. V. Crane of HPM; R. L. Rougemont of Reed-Prentice; E. W. Dickett of Sundstrand; Willard Spence of Brown & Sharpe C. R. Staub of Michigan Tool; and so many others.

28 Cutting Tool Manufacturers
Like E. J. Bryant of Greenfield Tap & Die; E. G. Moffat of Firth Sterling; A. N. Goddard of Goddard & Goddard; Harry Gotberg of Colonial Broach; A. H. d'Arcambal of Pratt and Whitney; A. J. Snyder of Morse Twist Drill; etc., etc.

47 Special Equipment Producers
Like R. E. Esch of Vickers; V. T. Malcolm of Chapman Valve; David Anderson of Bulova Watch; H. C. Gray of Falk Corp.; Frank Martindell of Teletype Corp.; W. H. Oldacre of Stuart Oil Gunnar Palmgren of SKF; H. E. Rockefeller, Linde Air Products; etc.

23 Materials Producers and Processors
Like F. S. Badger, Haynes Stellite; the staff of Aluminum Corporation; C. E. Tarpley, General Bronze; F. J. Titler, Republic Steel; G. O. Hiers, National Lead; C. D. Wright, Reliable Plastics, Ltd.; etc.

ORDER YOURS NOW!

PRICE
Members $11.00
Non Members $15.00

Please send the "Tool Engineers' Handbook" to the address below:
Payment enclosed in the amount of $..... Orders shipped to Canada will enter the country duty and tax free. Remittance may be made in Canadian funds at the same prices. Shipments to other countries are subject to import regulations.

Name .....

Chapter (if member) .....

Business Title ..... Firm Name .....

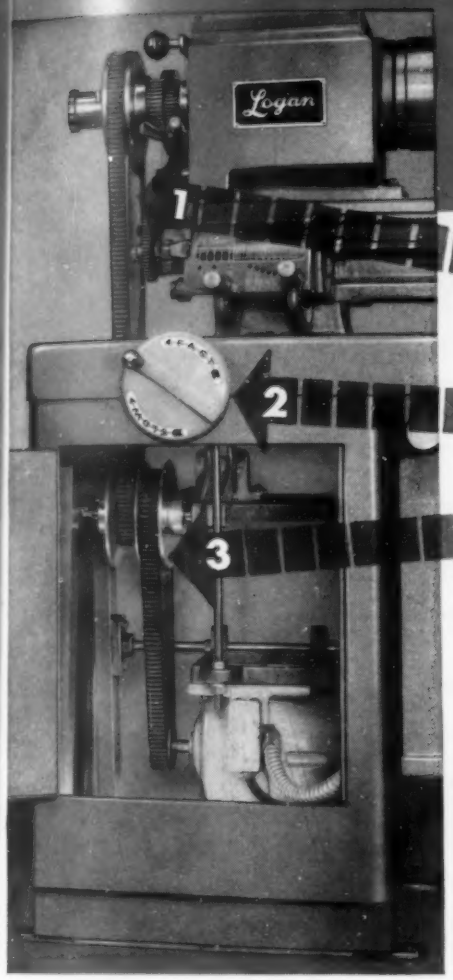
Street Address .....

City ..... Zone .... State .....

Remittance payable to the Society must accompany order. Do not send currency. Mail this order coupon or a facsimile to: American Society of Tool Engineers, Dept. 3, 10700 Puritan Ave., Detroit 21, Mich.
IMPORTANT—In order to obtain the special price of $11, orders must be sent to the Society.

R-S Butterfly Valves

VARIABLE SPEED DRIVE NOW OPTIONAL ON... Logan 12" SWING LATHE At No Extra Cost





No. 2955-V
12" Swing Lathe with
Variable Speed Drive

Principal Variable Speed Drive Parts

1. Upper Section showing spindle V-pulley and Vari-Speed belt.
2. Vari-Speed Control
3. Lower section, showing Variable Speed V-Pulleys and Vari-Speed belts.

Belts are easily replaced. Spindle Speed Chart on gear guard provides clearly marked settings for various speeds.

SEE IT AT YOUR LOCAL LATHE DEALER'S,
OR

Write for Information...

Full catalog descriptions and price information on request. WRITE TODAY TO

Provides Infinite Spindle Speeds, 38 to 1575 rpm.

The rugged, accurate Logan 12" Lathe is now available with either standard V-belt Drive, or the new Logan Variable Speed Drive, *at the same economical price*. Where the work handled requires a variety of spindle speeds, the time-saving speed correction of the Logan Variable Speed Drive definitely reduces costs. On large diameter facing, for example, the optimum surface speed is maintained by simply turning the Variable Speed Control Handle as the cutter goes into the work. No need to stop the lathe. No belt shifting. One control handle provides infinite spindle speeds between 38 and 1575 rpm, with all speed changes made *while the lathe is running*. This new optional feature, together with such standard Logan advantages as the massively proportioned ball bearing spindle; the balanced bed with the two V-ways and two flat ways precision ground; and the convenient new carriage . . . make the 12" Logan the lathe for profitable work.

Brief Specifications of Logan 12" Lathes

Swing over bed and saddle wings, 12"... Center Distances, 23" and 35"... Turret Lathes Models have 43" bed length... 1⅜" spindle hole... 1" collet capacity... 16 standard V-belt drive spindle speeds, 35 to 1230 rpm... Variable Speed Drive Models, infinite spindle speeds from 38 to 1575 rpm.

LOOK TO LOGAN FOR BETTER LATHES AND SHAPERS

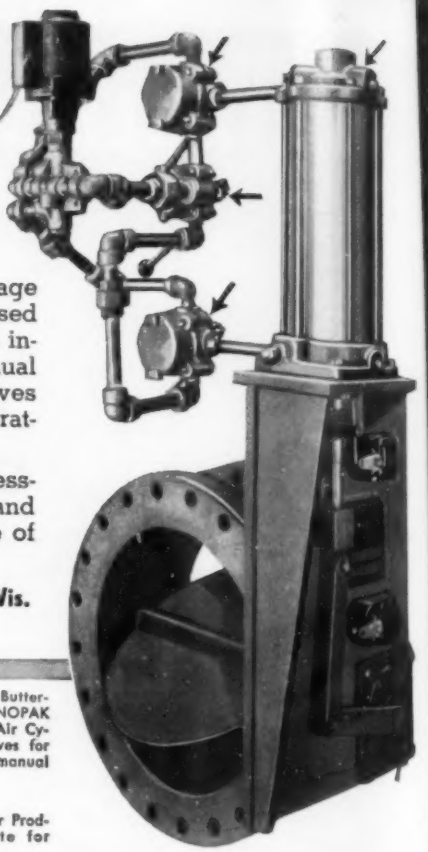
LOGAN ENGINEERING CO.

Lawrence and Lamon Avenues • Chicago 30, Illinois

R-S Butterfly Valves

to Regulate Flow of Liquids and Gases,

. . . *employ* NOPAK *Cylinders controlled by* NOPAK *Operating Valves*



In the chemical, paper, petroleum and steel industries, in sewage plants, water works and other utilities, R-S Butterfly Valves are used for fast, accurate flow-control of liquids, vapors and gases. In the interest of speed and efficiency, and to reduce or eliminate manual effort, the R-S Products Corp. of Philadelphia equips many of its valves with NOPAK Air or Hydraulic Cylinders controlled by NOPAK Operating Valves.

The R-S No. 789 Butterfly Valve pictured here is typical. This successful application may suggest how you can use NOPAK Valves and Cylinders in your plant operations, or to improve the performance of equipment that you build for others.

GALLAND-HENNING NOPAK DIVISION • 2750 S. 31st St. • Milwaukee 46, Wis.

Representatives in Principal Cities

NOPAK

VALVES AND CYLINDERS

DESIGNED for AIR and HYDRAULIC SERVICE

R-S No. 789 Heavy Duty Butterfly Valve equipped with NOPAK Model "D" 8" x 12" Air Cylinder and NOPAK Valves for optional solenoid or manual valve control.

Refer to Sweet's File for Product Designers or write for Bulletin SW-2.

A 7555-½H

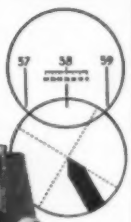
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-10-276-1

NEW LEITZ

TOOLMAKER MICROSCOPE



...PRODUCES HIGHEST PRECISION ....CUTS INSPECTION TIME



The NEW LEITZ DESIGN checks angular measurements in degrees and minutes.

Contains all Thread Templates for U. S. National thread profiles 6-80 pitch.

Contains Radii Templates from 21/64" to 13/16" by 1/64". Concentric circles from .010" to .280" by .010" and one blank compartment.

NOTE: TEMPLATES CAN BE OBSERVED IN 3 MAGNIFICATIONS: 10X - 20X - 30X

BE SAFE — SEND FOR LATEST BULLETINS

GEORGE SCHERR CO., Inc.

COMPLETE LINE OF PRECISION INSTRUMENTS

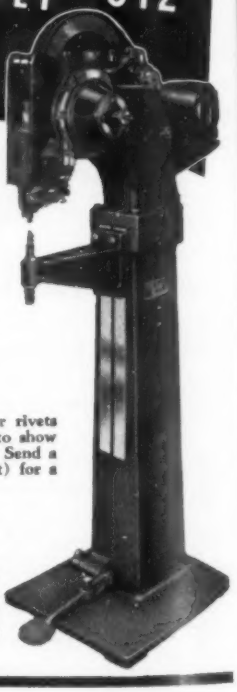
200 TE LAFAYETTE ST. • N.Y. 12, N.Y.

USE READER SERVICE CARD; INDICATE A-10-276-2

Chicago RIVET "912"

AUTOMATIC RIVET SETTER

CUTS COSTS 3 WAYS



1 FASTENS FASTER . . . Only the speed of the operator limits the 912's riveting speed. Completely automatic. A push on the foot pedal automatically feeds, inserts and clinches the rivet.

2 DOES WORK OF SEVERAL MACHINES Quick change rotary hopper and raceway makes the 912 adjustable in 5 to 10 minutes to set different size rivets. Adjustable anvil height and 12-inch throat provide further versatility.

3 SAVES ON MAINTENANCE . . . The 912 is massively built to stand the shocks of constant use and is designed for quick, easy servicing and parts replacement.

If your assembly calls for 3/16" steel tubular rivets or smaller, of 15/16" lengths or less, ask us to show you how the 912 can cut your fastening costs. Send a sample of your problem assembly (or blueprint) for a free fastening analysis.



FREE CATALOG

contains valuable engineering information and rivet specifications plus illustrated descriptions of 26 Chicago Automatic Rivet Setters.

Chicago Rivet & MACHINE CO.

9619 West Jackson Boulevard, Bellwood (Chicago Suburb) Illinois

***Branch Factory:* Tyrone, Pa.**

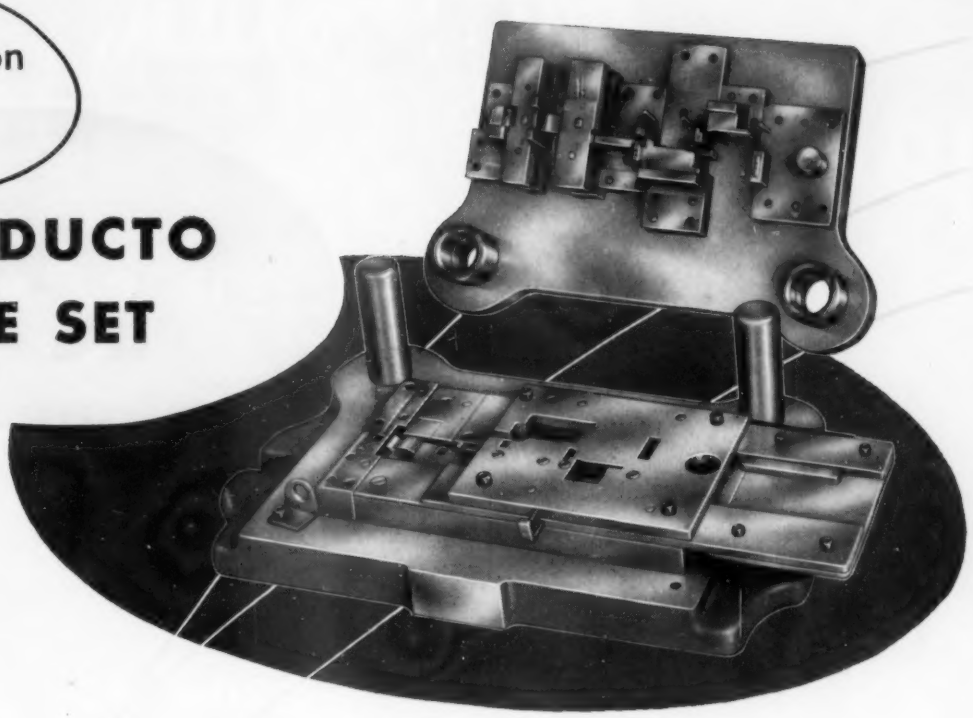
USE READER SERVICE CARD; INDICATE A-10-276-3

the

teamed precision of die and

PRODUCTO DIE SET

makes this intricate job possible

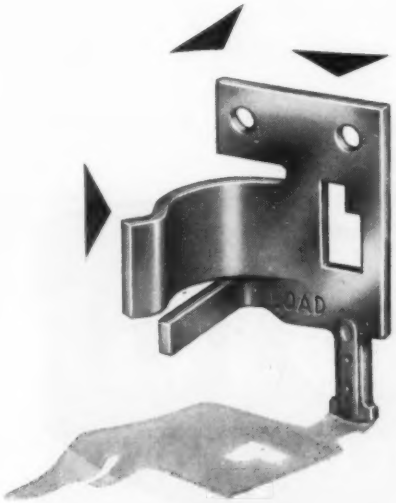




THE fuse terminal, shown below, is produced by the Federal Electric Products Co. for use in their Noark front operated safety switch. A Producto Die Set was selected to maintain the precise production of a top quality die at high speed operation.

Material is half hard 3/32″ copper (Rockwell 30-40 B scale), automatically fed to a Niagara 40 ton press. The progressive die stations are 1) pierce and stamp, 2) notch, 3) lance and emboss, 4) form 5) finish form. Die is held to extremely close tolerances. Production: 4000 pieces (1-3/16″ x 2-1/8″) per hour, 70,000 between grinds.

Today's production calls more than ever for quality control . . . which, in die work, necessitates the best in die sets. Call for Producto . . . and be sure!



1PD52

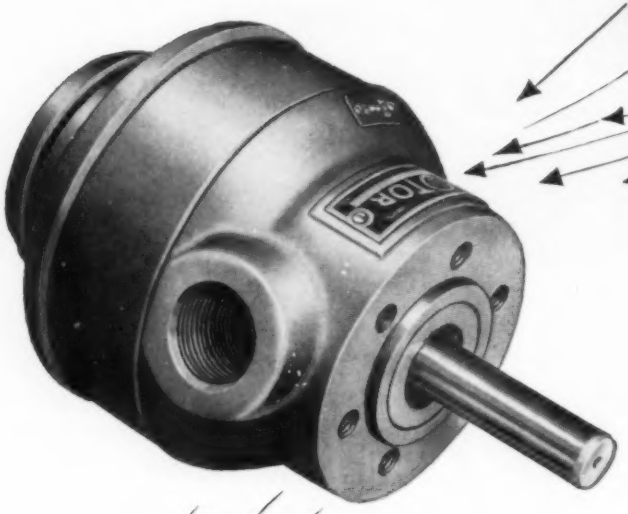
the **PRODUCTO MACHINE COMPANY**

930 HOUSATONIC AVENUE

BRIDGEPORT 1, CONNECTICUT

Automation

the "label" tells you it's unique



See the Gerotor name-plate on a hydraulic pump and you know what's inside . . . the renowned Gerotor mechanism. Both elements revolve in the same direction at low relative speed . . . minimizing friction, wear and slippage . . . assuring longer life, smoother flow, higher efficiency at lower operating cost.

Gerotor pumps are available in eleven sizes, some engineered for pressures up to 1200 p.s.i. continuous, 1500 p.s.i. intermittent. Deliveries range from .4 g.p.m. at 1800 r.p.m. to 40 at 1200. Plain, base or flange mountings. Specify Gerotor!

Gerotor May Corporation, Box 86, Baltimore 3, Md.

no other hydraulic pumps are like

GEROTOR
HYDRAULIC PUMPS

Automation PLUS Flexibility

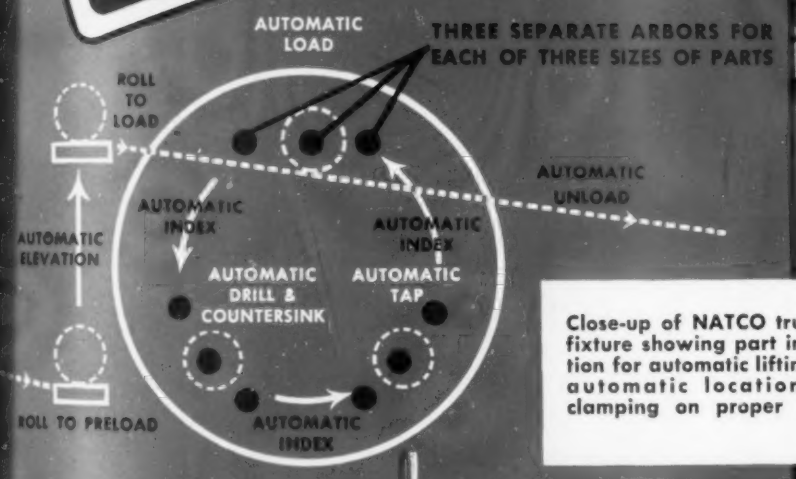
3 SIZES of TRACK ROLLERS

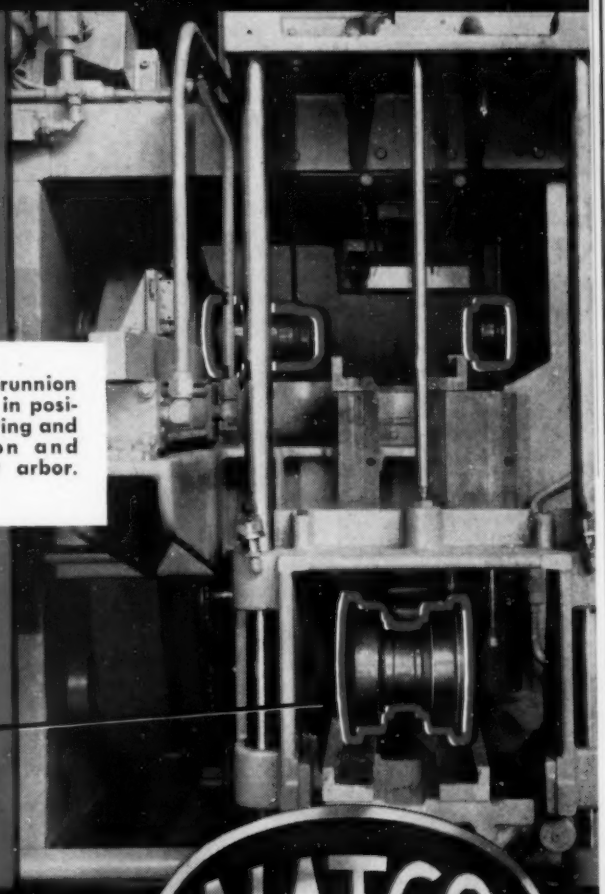
(Both right and left hand parts)
Automatically
Loaded and Unloaded
Drilled, Countersunk
and Tapped (Both Ends)

70 PARTS PER HOUR

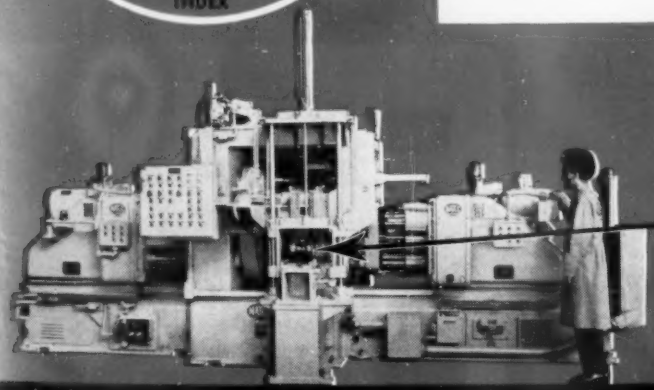
ON THIS NATCO 2-WAY HOLESTEEL

NATCO ENGINEERED for Quality and Quantity Production.





Close-up of NATCO trunnion fixture showing part in position for automatic lifting and automatic location and clamping on proper arbor.





Call a Natco Field Engineer
to help you solve your problems in
Drilling, Boring, Facing and Tapping.

NATCO

NATIONAL AUTOMATIC TOOL COMPANY, INC., Richmond, Indiana

Branch Offices
CHICAGO, 2009 Engineering Bldg. • DETROIT, 409 New Center Bldg.
BUFFALO, 1807 Elmwood Ave. • NEW YORK, 35 Beechwood Ave., Mount Vernon

PYLE NATIONAL INCREASES PRODUCTION 47%!

Soldering Of Spring Assemblies Speeded By *LINDBERG* Induction Heating Unit



An hourly production increase of 47% . . and a per-operator production increase of 330% through the use of a Lindberg Induction Heating Unit! These are the money saving facts and figures reported by Pyle National Co., Chicago manufacturer of electrical components.

The company uses a 10 KW Lindberg unit for the production soldering of flanges to coil springs in the manufacture of torsion spring assemblies. The time cycle is 11 seconds for each assembly.

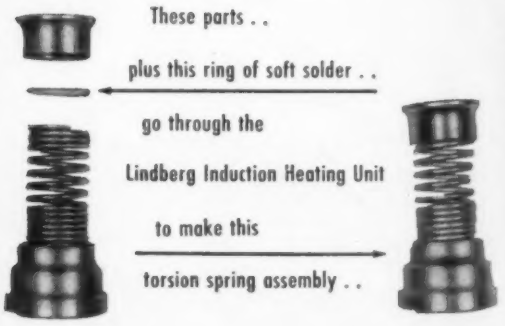
Production has been increased to 125 assemblies an hour . . with one girl operating the equipment. This is an hourly increase of 40 assemblies over the former method where soldering was done by a team of three men using gas torches. And the hourly per-operator production is up from 28 to 125!

With the induction heating unit, there are no open flames from gas torches. No extra exhaust fans are required . . there is little danger of burns to operators . . fire hazards are virtually eliminated!

And there is a substantial economy of floor space! Formerly the three torch operators required more than 60 square feet of floor space . . but the Lindberg Induction Heating Unit requires less than 30 square feet.

If your requirements call for production soldering, brazing, hardening, annealing, stress relieving, hot forming, forging or shrink fitting, investigate Lindberg Induction Heating Units. Ask for Bulletin 1440.





LINDBERG

HIGH FREQUENCY DIVISION
LINDBERG ENGINEERING COMPANY

check these advantages of

REYNOLDS ALUMINUM

CAST PLATE AND BAR

To lower your Tool, Die and Fixture costs



Low Cost

Low material cost, fabrication savings and high salvage value offer economies in experimental and short-run work and, in some cases, production runs. Machine-tool fixtures can be fabricated by inexpensive welding. Aluminum dies can be easily welded or repaired, cutting maintenance costs.

Precision Cast and Engineered

Advanced casting technique and control eliminates internal shrinks or voids—holds inclusions to an absolute minimum.

Fine, Dense Grain Structure

Better die finishes, easier machining and reduced wear are made possible.

Surface Machined

All plate and bar is surface milled to closer tolerances on thickness and flatness, reducing fabrication machining.

Fast, Free Machining

Free machining cuts die fabrication time 40-60%, permits closer tolerances, reduces costs.

Better Die Lubrication

Cast structure offers better wetting and lubricant film retaining properties for forming.

Excellent Thermal Characteristics

Aluminum's high conductivity and rapid heat dissipation minimizes localized heat buildup due to friction and forming stresses.

Light Weight

Aluminum, weighing only one-third as much as steel or zinc-base metals, saves labor in tool change-over, often eliminates the need for hoists, reduces handling and storage costs.

Wide Range of Standard Sizes

Enables ordering your requirements with minimum waste and simplified fabrication of tools, dies and fixtures.

For full details on Reynolds Aluminum Cast Plate and Bar, call your nearby Reynolds office listed under "Aluminum" in your classified phone directory, or write Reynolds Metals Company, 2525 South Third Street, Louisville 1, Ky.

Write for free brochure, "Reynolds Aluminum Cast Plate and Bar for Machine Shops, Foundries and Pattern Shops."

SEE *"Mister Peepers"* Sundays, NBC-TV. Consult local listings for time and station.

REYNOLDS ALUMINUM

MODERN DESIGN HAS ALUMINUM IN MIND



Step up YOUR OUTPUT



Size OOBLC Screw Driver quickly drives #10-32 round head screws on a household ironer assembly.



A Size OOAMC Screw Driver makes quick work of driving #10 screws 1½" long to attach the spring mechanism on a rocking chair. The wood involved is alder; not predrilled.



Here a Size OOOBLC Screw Driver is used to assemble clocks. The job consists of driving Reed-Prince screws.



A Size OALC Screw Driver speeds the installation of the hood lock on an Automotive Assembly line.

with Ingersoll-Rand Air Powered Screw Drivers

46 sizes of air powered screw drivers are available with attachments to drive any type of threaded fastener.

Reversible and non-reversible models, also angle screw drivers.

More production in auto plants! . . . *More production* in an electric clock factory! . . . *More production* on a farm equipment assembly line! . . . *More production* of oil burners, metal products, home appliances, and products of every kind and description.

The credit? Ingersoll-Rand Air Powered Screw Drivers—with features that make it the world's best! The "Cushion" Clutch . . . amazing I-R Multi-Vane Air Motor . . . Torque Limiting Clutch . . . and many other design points enable operators to turn out more jobs with less effort.

TRY 'EM AND SEE! Phone or write your Ingersoll-Rand office today for details. No obligation.

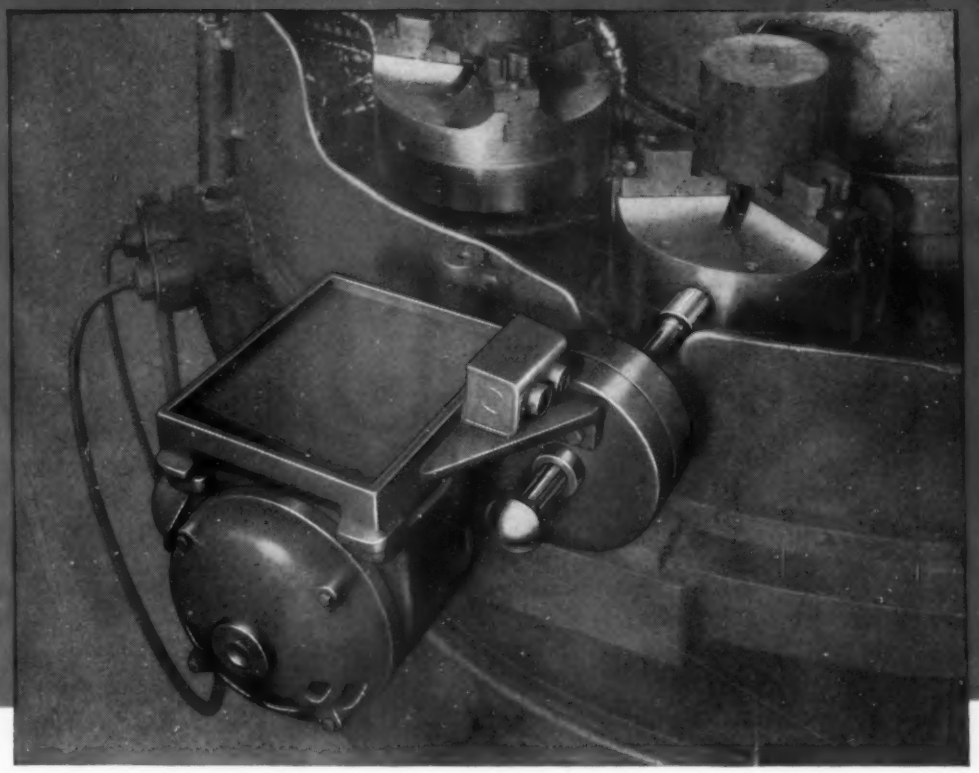
Ingersoll-Rand

11 Broadway, New York 4, N. Y.

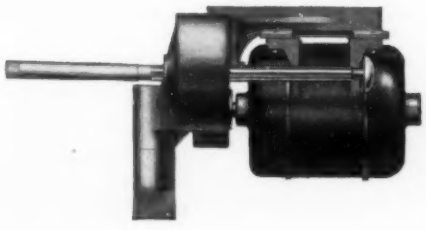
920-8

CUSHMAN

POWER WRENCH REDUCES OPERATOR FATIGUE *SPEEDS PRODUCTION* ON MULTI-SPINDLE MACHINES



Conserve your man-power and speed production with the Cushman Electric Power Wrench, designed and developed by the Cushman Engineering Department for use on multi-spindle chucking machines and vertical lathes to eliminate physical labor and time-consuming hand wrenching operations. When used with the Cushmatic Control Cabinet, torque at the wrench end can be predetermined and maintained at any desired value from 150 to 600 ft. lbs. with a 24 ft. lb. motor, or 45 to 180 ft. lbs. with an 8 ft. lb. motor. All parts are totally enclosed and operated in an oil bath, assuring constant, dirt-free lubrication and long, trouble-free, heavy duty service. Write for Bulletin No. 211-D or consult the Cushman Engineering Department for special applications.



THE CUSHMAN CHUCK COMPANY
817 WINDSOR STREET
HARTFORD 2, CONNECTICUT, U. S. A.

Chucking Engineers Since 1862

Manufacturers of

AIR CHUCKS, CYLINDERS, and ACCESSORY EQUIPMENT • THE CUSHMAN POWER WRENCH • CUSHMAN MANUALLY OPERATED CHUCKS and FACE PLATE JAWS.



"National security is impossible without financial security of individual citizens..."

FRED MAYTAG
The Maytag Company

"Ingenious research and the ability to produce . . . which have helped to make the United States the world's greatest nation . . . could not have been realized without the savings of millions of thrifty persons. Savings of individuals financed new inventions, developed others. The Payroll Savings Plan for purchasing Savings Bonds regularly provides an easier way for American workers to save for future spending or investment, for their own security, and for their nation's security. Our experience at the Maytag Company has shown us that a successful Payroll Savings program can be the foundation and the cornerstone of happy employee relations."

Let's point up Mr. Maytag's concise summary of the Payroll Savings Plan with a few very recent figures:

• at the close of February, 1953, the *cash value* of Series E Bonds held by *individuals* reached a new high: $35.5 billion. This is $1 billion more than the value of the Bonds held on May 1, 1951, when E Bonds began to mature.

• to this encouraging reservoir of future purchasing power, 8,000,000 Payroll Savers are adding $160,000,000 per month by their consistent investment in U.S. Savings Bonds.

• unit sales of E Bonds in 1952 reached the highest level of the past six years—more than 77 million individual pieces. Of the 77 million units, 67 million were in the $25 and $50 denominations—the bonds bought chiefly by Payroll Savers.

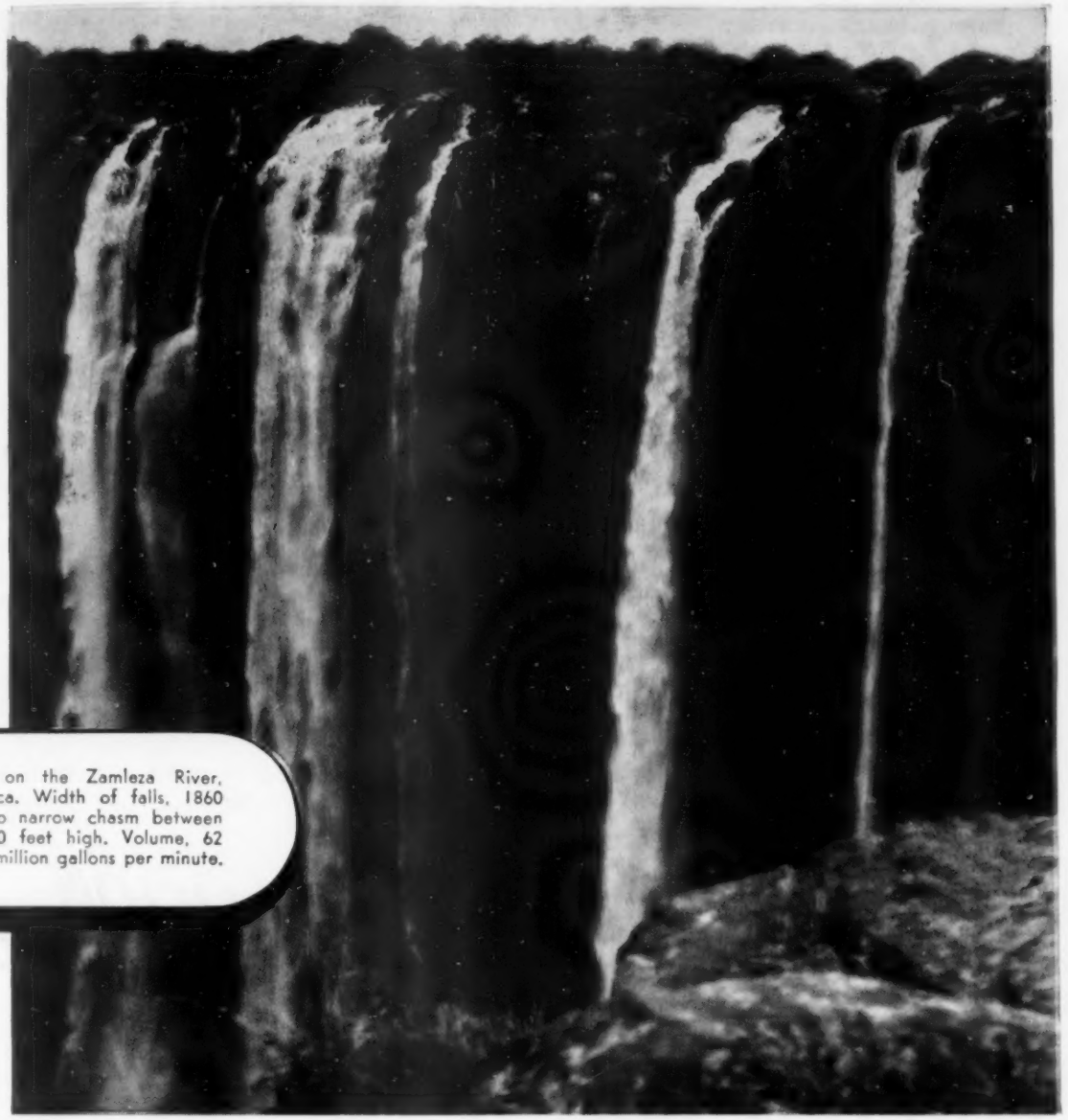
• Payroll Savers are serious savers—of the approximately $6 billion Series E Bonds which had become due up to the end of March, $4.5 billion, or 75%, were retained by their owners beyond maturity.

If you are not among the 45,000 companies that make the benefits of the Payroll Savings Plan available to their employees . . . or if you do have a Plan and your employee participation is less than 50%, a telegram or letter to Savings Bond Division, U.S. Treasury Department, Washington Building, Washington, D. C., will bring you all the information and assistance needed to build a *good* Payroll Savings Plan.

The United States Government does not pay for this advertisement. It is donated by this publication in cooperation with the Advertising Council and the Magazine Publishers of America.

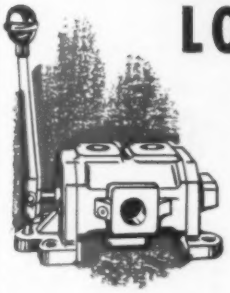
AMERICAN SOCIETY OF TOOL ENGINEERS
10700 Puritan Avenue **Detroit 21, Michigan**

LOGAN FLUID POWER • DURABLE, DEPENDABLE SINCE 1916



Victoria Falls on the Zamleza River, Rhodesia, Africa. Width of falls, 1860 feet. Spills into narrow chasm between sheer walls 400 feet high. Volume, 62 million to 100 million gallons per minute.

LOGAN HYDRAULIC CONTROL VALVES

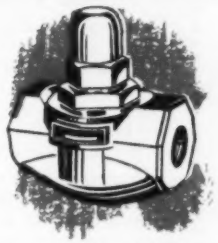


Illustrated, Model 4095—4-way, 2-position valve for directing pressure alternately to ends of double-acting hydraulic cylinder.

A broad range of types and sizes to most effectively meet any requirement—Design Engineers, Machine Operators, Maintenance Men appreciate these Logan advantages

- LONG-LIFE CONSTRUCTION
- EASY TO SERVICE
- INFREQUENT MAINTENANCE
- EASE OF INSTALLATION
- EFFORTLESS OPERATION
- UNRESTRICTED PORTING

Let Logan Engineers help you design your Air and Hydraulic Circuits



Illustrated, Model 8015 adjustable speed control valve. Install between operating valve and one end of cylinder to meter flow of oil in one direction with free flow on return.

LOGAN MANUFACTURES 6,975 STANDARD CATALOGED ITEMS

FREE CATALOG ON REQUEST

AIR CONTROL VALVES, Cat. 100-4 • AIR CHUCKS, Cat. 70-1 • AIR CYLINDERS, Cat. 100-1 • AIR-DRAULIC CYLINDERS, Cat. 100-3
AIR and HYDRAULIC PRESSES, Cat. 51 • COLLET GRIP TUBE FITTINGS, Cat. 200-5 • HYDRAULIC CONTROL VALVES, Cat. 200-4
HYDRAULIC CYLINDERS, Cats. 200-2; 200-3 • HYDRAULIC POWER UNITS, Cat. 200-1 • SURE-FLOW COOLANT PUMPS, Cat. 62

SAVES TIME — Logan — AIR AND HYDRAULIC EQUIPMENT — EFFORT • MOTION

LOGANSPORT MACHINE CO., INC., 839 CENTER AVE., LOGANSPORT, IND.

WHEN YOU NEED
COOLANT
YOU
NEED
A
RUTHMAN
GUSHER COOLANT PUMP



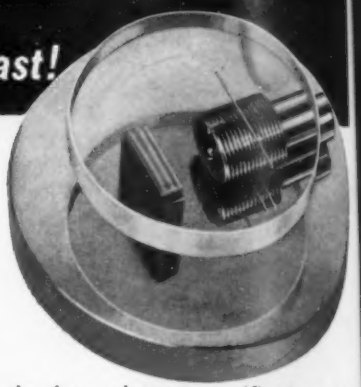
This Special Chamfering Machine manufactured by the Cleveland Tapping Machine Company is equipped with a Gusher Coolant Pump.



On any cutting operation that demands the use of a coolant, a Gusher Coolant Pump offers you efficiency, dependability, and long trouble-free life. You get split second flow of coolant from the moment the machine is turned on. There is no packing or priming necessary. The simple construction, electronically balanced rotating shaft and heavy-duty pre-lubricated ball bearings of Gusher Coolant Pumps assure you dependable service. Write us today, we'll be glad to send you full information on types and models of Gusher Coolant Pumps.

THE RUTHMAN MACHINERY CO.
1810 READING ROAD CINCINNATI, OHIO
USE READER SERVICE CARD; INDICATE A-10-286-1

Measure in Millionths with LIGHT WAVES
It's Easy...Fast!

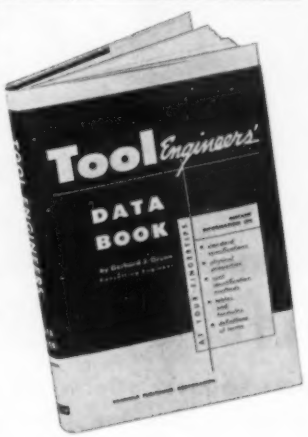


Determine Surface Flatness At a Glance

Meet today's extremely close tolerance specifications with modern scientific measuring equipment. Using Acme optical equipment, it is as easy to measure to millionths of an inch, as it is to measure in tenths with a micrometer. Make your measurements via light waves with Acme equipment. Write for complete information.

Acme Scientific Company
manufacturers of optical flats and monochromatic lamps...mold polishing
1453 West Randolph Street • Chicago 7, Illinois
USE READER SERVICE CARD; INDICATE A-10-286-3

NOW... instant information on specifications, properties, formulas!



Tool engineers'
DATA BOOK
by GERHARD J. GRUEN
Consulting Engineer

With this valuable new book at your finger tips, you have quick, easy access to *all* of the tables, formulas, constants and specifications needed by tool engineers and designers!

You no longer need to wade through wordy volumes of theory to find the data you want. This concise, compact book includes all latest developments and complete data on: the general properties of special alloys and stainless steels; spot identification of metals, alloys and plastics; blank size diameters for shells; and a vast amount of other usually hard-to-find or extremely recent information. It also gives conversion tables, mathematical tables and a glossary of metallurgical terms.

1953 224 pages $5.50

Send for your on-approval copy today!

REINHOLD PUBLISHING CORP.
Dept. M-560
330 West 42nd Street New York 36, N. Y.
USE READER SERVICE CARD; INDICATE A-10-286-2

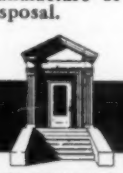
PRECISION CIRCULAR CUTTERS



MEYCO carbide tipped and solid carbide cutters have earned an enviable reputation in plants where long tool life and precision workmanship is a MUST.

These cutters can be furnished in various diameters and thicknesses to meet the requirements of individual applications.

Saws and cutters, both carbide tipped and solid carbide, will aid production and precision in your slotting, venting, slitting and grooving operations . . . and they will be manufactured to your specifications. Please furnish complete specs and quantities desired when requesting prices and indicate material to be cut. MEYCO experience in the manufacture of precision tools, since 1888, is at your disposal.



W. F. MEYERS CO., INC., BEDFORD, INDIANA
USE READER SERVICE CARD; INDICATE A-10-286-4

ARMOR-TUF

THE AMAZING NEW STEEL HARDENING COMPOUND



"ARMOR-TUF hardens tools and steel parts as easily as baking pie, and much more quickly."

Now used by leading steel processors and other manufacturers everywhere!

You can use milder, cheaper steels for many applications and machine them before hardening. The saving is two-fold: less expensive steels and lower machining costs. ARMOR-TUF gives low carbon steels the cutting and wearing properties of tool steels. You can harden the softest steels to a degree ordinarily obtainable only in high priced steels.

Service between sharpenings increased 10 times and more. Tools hardened with ARMOR-TUF hold their edges many times longer. The advantages: substantially reduces resharpening costs . . . saves on time lost changing dull tools . . . keeps tools in service . . . enables increased production as result of less frequent tool changing and sharpening.

As compared with the usual heat treating processes, the saving in time is great. Instead of hours, only minutes are needed. The entire hardening process takes less than ten minutes .

No CYANIDE, Absolutely—ARMOR-TUF is safe to use, contains no cyanide of any kind—there are no toxic fumes.

ARMOR-TUF IS UNCONDITIONALLY GUARANTEED TO INCREASE THE LIFE OF TOOLS AT LEAST 300%, OR YOUR FULL PURCHASE PRICE WILL BE REFUNDED.

Index of The Tool Engineer Advertisers

October 1953 Issue

The Index to Advertisers is published as a reader service. Although every precaution is taken to assure correct listing, no allowance will be made for error or omission.

♦User of ASTE Data Sheets

A

♦Acme Industrial Co. 256
Acme Scientific Co. 286
Acme Tool Co. 268
Air Conversion Research Corp. 261
Alkon Products Corp. 268
Allegheny Ludlum Steel Corp. 240
Allen Mfg. Co. 177
Allied Products Corp.,
Richard Brothers Division 200
Aluminum Company of America 253
American Brass Co. 21
American Broach & Machine Co.,
Division of Sundstrand Machine Tool Co. 206
♦American Chain & Cable Co.,
Campbell Machine Division 227
Wilson Mechanical Instrument Division 218
American Roller Die Corp. 135
American Society of Tool Engineers 225A-274
Ames, B. C., Co., The 133
Ampco Metal, Inc. 273
Anderson, F. E., Oil Co. 156
Anker-Holth Division,
Wellman Engineering Co. 160
Armor-Tuf Sales Corp. 287
Armstrong-Blum Mfg. Co. 125
Armstrong Bros. Tool Co. 152
Arter Grinding Machine Co. 117
Automatic Steel Products, Inc.,
Cleveland Tapping Machine Co., The, Subsidiary 155

B

Baker Brothers, Inc. 258
Balas Collet Mfg. Co. 290
Baumbach, E. A., Mfg. Co. 186
Bay State Abrasive Products Co. 175
Behr-Manning Corp. 194-195
Bellows Co., The 262
Besly-Welles Corp. 246
Bethlehem Steel Co. 269
♦Boyar-Schultz Corp. 202
♦Bristol Co., The 184
Brush Electronics Co. 189-190
Bryant Chucking Grinder Co. 234-235
Bryant Machinery & Engineering Co. 201
Buck Tool Co. 137
Buhr Machine Tool Co. 209
Bullard Co., The 221

C

Cadillac Stamp Co. 22
Campbell Machine Division,
American Chain & Cable Co. 227
Carborundum Co., The 180-181
Card, S. W., Division,
Union Twist Drill Co. 226
Carlton Machine Tool Co. 214
Chicago Rivet & Machine Co. 276
Chicago Tool & Engineering Co. 289
Cincinnati Lathe & Tool Co. 171-172
Cincinnati Shaper Co. 26, 34-35
Cleereman Machine Tool Co. 201
Cleveland Cap Screw Co. 157
Cleveland Instrument Co. 110
Cleveland Tapping Machine Co., The
Subsidiary of Automatic Steel Products, Inc. 155
Cleveland Twist Drill Co. 207
Collins Microflat Co. 252
Colonial Broach Co. 217
Colonial Bushing Co., Inc. 264
Columbia Export Co., Inc. 161
Columbia Tool Steel Co. 137
Comtor Co. 216
Cone Automatic Machine Co. 187
Consolidated Machine Tool Corp.,
Modern Tool Works Division 213
Cosa Corp. 192-193
Cro-Plate Co., Inc., The 248
Cross Co. 40
Crucible Steel Company of America
Hollow Tool Steel Division 228
Tool Steel Division 233
Cushman Chuck Co. 283

D

Danly Machine Specialties, Inc. 173, 265
♦Delta Power Tool Division,
Rockwell Mfg. Co. 224
Detroit Die Set Corp. 148
Detroit Reamer & Tool Co. 174
Detterbeck, Geo. L., Co. 222
DeVlieg Microbore Co. 185
Diamond Tool Research Co. 264
Drillunit, Inc. 124
♦Dumore Co., The 151
Dykem Co., The 186

E

Eastman Kodak Co. 237
♦Eclipse Counterbore Co. 226A
Engis Equipment Co. 142
Erickson Tool Co. 126
Ex-Cell-O Corp. ..... Inside Back Cover

F

Farquhar, A. B., Division,
Oliver Corp., The 140
Federal Products Corp. 223
Fellows Gear Shaper Co. 178-179
Fonda Gage Co. 121
Foote-Burt Co., The 228
Fuller Tool Co. 256

G

♦Gairing Tool Co. 153
Galland-Henning Mfg. Co. 276
Gammons-Hoaglund Co. 216
Geometric Tool Company Division,
Greenfield Tap & Die Corp. 244
Gerotor May Corp. 278
Gisholt Machine Co. 29-30-31-32
Glenzer, J. C., Co. 272
Gorham Tool Co. 130
Graymills Corp. 127
Greenfield Tap & Die Corp. 243-244
Greenlee Bros. & Co. 251
Grobet File Company of America 222
Guthery Machine Tool Co. 159

H

Hammond Machinery Builders, Inc. 102
Handy & Harman 158
Hannifin Corp. 10
Hardinge Bros., Inc. 5
Hartford Special Machinery Co. 212
Hassall, John, Inc. 123
Haynes Stellite Co.,
A Division of Union Carbide & Carbon Corp. 250
Heald Machine Co. ..... Inside Front Cover
Heinrich Tools, Inc. 248

I

Illinois Tool Works 211
Ingersoll-Rand, Inc. 282

J

Jahn, B., Mfg. Co., The 150
Jarvis, Charles L., Co. 118-119
Jessop Steel Co. 257
♦Jones & Lamson Machine Co. 204

K

Kaufman Mfg. Co. 248
Kearney-Trecker Corp. 241
Keller Tool Co. 129
Kennametal, Inc. 138
♦Kingsbury Machine Tool Co. 230-231
Knight, W. B., Machinery Co. 109

L

Landis Machine Co. 8
Lapointe Machine Tool Co., The 16
Latrobe Steel Co. 263
Lavallee & Ide, Inc. 107
Lee, K. O., Co. 186
Lehmann Boring Tool,
Division of Novo Engine Co. 143
Lindberg Engineering Co. 280
Lindberg Steel Treating Co. 259
Littell, F. J., Machine Co. 124
Logan Engineering Co. 275
Logansport Machine Tool Co., Inc. 285

M

Machine Products Corp. 256
M. B. I. Export and Import, Ltd. 254-255
Metal Carbides Corp. 202
Meyers, W. F., Co. 286
Micrometrical Mfg. Co. 154
Miller Motor Co. 170
Modern Industrial Engineering Co. 196-197
Modern Tool Works Division,
Consolidated Machine Tool Corp. 213
Moline Tool Co. 289
Moore Special Tool Co. 132
Morse Twist Drill & Machine Co. 14-15
Morton Machine Works 216
Motch & Merryweather Machine Co., The 167

N

National Automatic Tool Co. 279
National Broach & Machine Co. 191
♦National Twist Drill & Tool Co. 6-7
Neico Tool Co. 163

New-Field Machined Parts Co. 222
Newman, L. 272
Niagara Machine & Tool Works 24-25
Nilsson Gage Co. 128
Nobur Mfg. Co. 252
Norton Co., The,
Abrasive Grinding Wheels Division 12-13
Abrasive Grains Division 260
Nu Tangs, Inc. 256

O

Oakite Products, Inc. 247
Ohio Crankshaft Co., The
TOCCO Division 38
OK Tool Co. 229
Oliver Corp., The,
A. B. Farquhar Division 140
O'Neil-Irwin Mfg. Co. 127
Ortman-Miller Machine Co. 115
Osborn Mfg. Co. 166
Ottemiller, Wm. H., Co. 252

P

Parker-Majestic, Inc. 210
Pedrick Tool & Machine Co. 252
Pioneer Tool & Engineering Co. 120
Pittsburgh Tool Steel Wire Co. 249
Pope Machinery Corp. 11
Portage Double Quick Tool Co. 114
Potter & Johnston Co.,
Subsidiary of Pratt & Whitney Division,
Niles-Bement-Pond Co. 165
Pratt & Whitney Division,
Niles-Bement-Pond Co. 23, 144-145
Precise Products Corp. 134
Producto Machine Co. 277

R

R and L Tools, Inc. 208
Reed Rolled Thread Die Co. 122
Reinhold Publishing Co. 286
Reynolds Metal Co. 281
Richard Brothers Division,
Allied Products Corp. 200
Richards, J. A., Co. 216
Ring Punch & Die Co. 272
Rivett Lathe & Grinder Co. 28
‡Rockwell Mfg. Co.,
Delta Power Tool Division 224
Rotor Tool Co. 188
Russell, Holbrook & Henderson, Inc. 219
Ruthman Machinery Co. 286

S

Scherr, George, Co., Inc. 276
‡Scully-Jones & Co. 168-169
Sentry Co., The 139
Service Machine Co. 186
Severance Tool Industries 272
Sheffield Corp. ..... Back Cover
Sheldon Machine Co. 141
Simonds Abrasive Co. 104
Simonds Saw & Steel Co. 271
Simplex Machine Tool Corp. 270
Sorenson Center-Mike Corp. 108
S-P Mfg. Corp. 147
Spiral Step Tool Co. 215
Standard Gage Co. 4
‡Standard Machine & Tool Co., Ltd. 202
Standard Parts Co. 120
Standard Pressed Steel Corp. 220
Standard Tool Co. 27
Steel Products Engineering Co., The 101
Sterling Abrasives Division,
Cleveland Quarries Co. 198-199
Stuart, D. A., Oil Co., Ltd. 33
Sun Oil Co. 2
Sundstrand Machine Tool Co.,
American Broach & Machine Co., Division 206
Super Tool Co. 146
Sutton Tool Co. 182
Syntron Co. 112

T

Thompson Grinder Co. 183
Thompson, Henry G., & Son Co. 164
Threadwell Tap & Die Co. 17-18-19-20
Timken Roller Bearing Co. 242
Tomkins-Johnson Co., The 136
Tubular Micrometer Co. 264

U

Union Twist Drill Co.,
S. W. Card Division 226
Union Division 225
Union Carbide & Carbon Corp.,
Haynes-Stellite Co., Division 250
U. S. Drill Head Co. 162
U. S. Hoffman Machinery Co. 268
Universal Engineering Co. 203

V

Van Keuren Co. 176
Vulcan Tool Co. 218

W

Wade Tool Co. 9
Waldes Kohinoor, Inc. 205
Walker, O. S., Co., Inc. 222
Walton Co., The 186
Ward Leonard Electric Co. 113
‡Warner & Swasey Co., Inc. 232
Waukesha Tool Co. 239
Wendt-Sonis Co. 111
Wellman Engineering Co.,
Anker-Holth Division 160
Wesson Co. 36
Wesson Metal Corp. 37
Wheel Trueing Tool Co. 245
Whistler, S. B., & Sons, Inc. 116
Whiton Machine Co. 149
‡Wilson Mechanical Instrument Division,
American Chain & Cable Co. 218
‡Winter Brothers Co.,
Division of National Twist Drill & Tool Co. 6-7
Woodworth, N. A., Co. 236

Y

Yoder Co. 267

Z

Zagar Tool Co. 134
Ziegler, W. M., Tool Co. 248

THE TOOL ENGINEER REGIONAL ADVERTISING OFFICES

EASTERN—Austin G. Cragg, 400 Madison Ave., Phone: Plaza 9-4018, New York 17, New York
OHIO—Richard E. Cleary, Commercial Bank Building, Phone: Berea 4-7719, Berea, Ohio
CENTRAL—Clarence T. Etter, 10700 Puritan Avenue, Phone: University 4-7300, Detroit 21, Michigan
WESTERN—Stanley F. Girard, 540 N. Michigan Avenue, Phone: Michigan 2-4465, Chicago 11, Illinois
PACIFIC COAST—W. R. McIntyre, 423 First Trust Bldg., Phone: Ryan 1-6981, Pasadena 1, California
W. R. McIntyre & Associates, Room 1085, 681 Market Street, Phone: Douglas 2-4475, San Francisco, California

PALMGREN

ROTARY, INDEX, MILLING TABLE

The only Table Having ROTARY FEED Combined With DUAL CROSS FEEDS!



No. 83

This PALMGREN TABLE is sensational in price, construction and performance. Just what shops need for accurate, precision work. You can mill straight or curved, slot, drill, also rout, rabbet, mortise and sand on wood. Do hundreds of jobs as milling slots, grooves, keyways, squares, hexagons, curves, flats, dovetails, indexing and laying out work. Designed for use on Drill Press or Milling Machine. It handles all types of metal and woodworking operations and makes your drill press a vertical milling machine. Precision built. It permits close tolerances. Rotary Feed is calibrated in degrees. Cross Feeds in thousandths. Cross slides and feeds are 2½" each side of center—4½" overall. Has Acme thread cross feed screws, adjustable gibs on cross slides—40 to 1 worm and gear ratio in rotary feed. 4 Bolt slots—2 lock screws.

No. 83 Table Dia. 8", T-Slots ⅝", Base Keyway ⅜", Base Dia. 6¼". Ht. 5". Wt. 37 lbs. Price only $54.50.

Now Only $54.50

Turns Your DRILL PRESS Into A VERTICAL MILLER

Order Today! If dealer can't supply, write us. Ask for Catalog No. 201

CHICAGO TOOL and ENGINEERING CO.
Mfrs. of PALMGREN PRODUCTS Since 1918
8391 South Chicago Ave. • Chicago 17, Ill.

USE READER SERVICE CARD; INDICATE A-10-289-1

SINCE 1901
MOLINE "Hole-Hog"
SPECIALLY DESIGNED
MACHINE TOOLS

have cut production costs for American Industry.

DRILLING • BORING
HONING • TAPPING
and Special Machines



MOLINE TOOL CO.
"HOLE-HOG"
MOLINE, ILLINOIS

Boring V-8 Engine Cylinders

USE READER SERVICE CARD; INDICATE A-10-289-2

THE *Kohinoor* DIAMOND

always stands out among jewels



in

PUSHERS

it's

BALAS

For maximum feeding efficiency and reduced stock waste, Balas Pushers and Feed Fingers consistently prove themselves outstanding. Balas Pushers, made in the widest variety of styles and sizes, give you better production at lower unit cost... increased output from both operators and machines. Investigate the advantages of these accurate, dependable Balas Pushers; you will find it profitable to use them on all your screw machines and lathes.

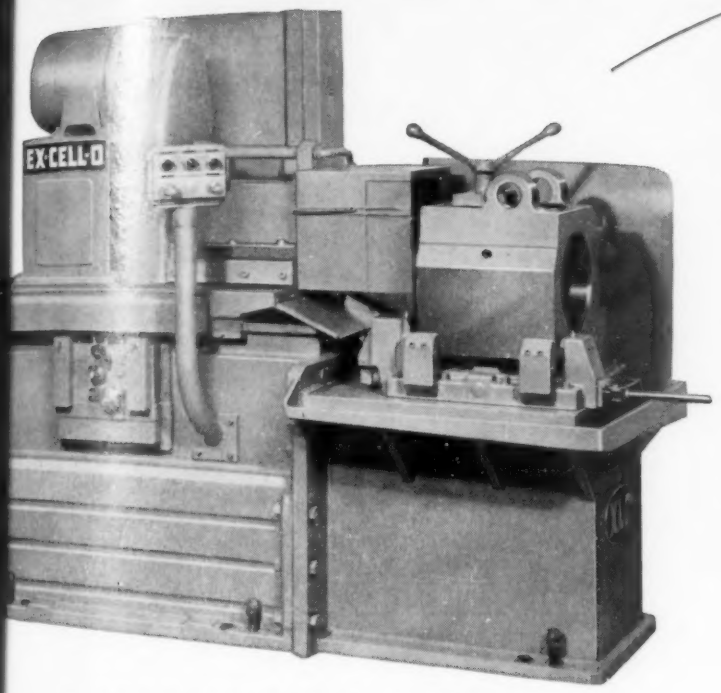


Heavy Duty Cage-Type Pusher

BALAS COLLET MANUFACTURING COMPANY

CLEVELAND 14, OHIO

WORLD'S LARGEST MANUFACTURER OF COLLETS EXCLUSIVELY



Ex-Cell-O One-Way Precision Boring Machine is equipped for operations on a heavy gun part. The machine table carries a precision boring spindle with its drive equipment, and the end section supports the fixture.

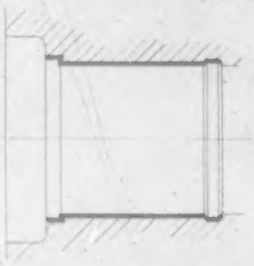
EX-CELL-O

WAY MACHINE

PRECISION BORES, COUNTERBORES . . . AND GROOVES A 600-lb. STEEL FORGING

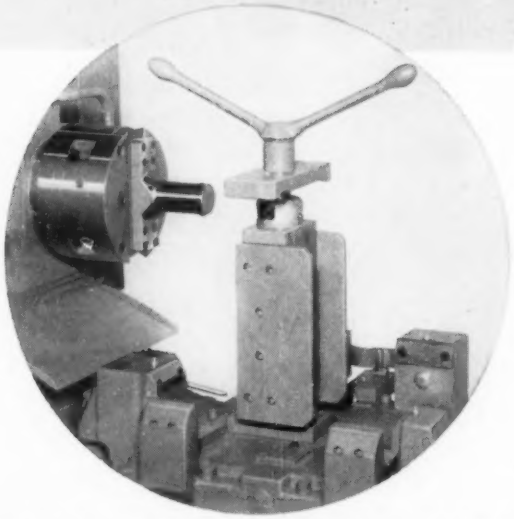
XLO
EX-CELL-O for PRECISION

On a large gun part, operations shown in the heavy lines are performed in an automatic cycle.



As the table feeds forward the boring and counterboring operations are performed, then the shoulder is plunge-faced at a reduced feed rate. When the table engages a positive stop the cross feed head plunges the grooving tool to the required depth, then the table feeds back to another positive stop which limits the width of the groove. The cross-feed head retracts and the table returns to the starting position.

Ask your local Ex-Cell-O representative about all the other advantages of Ex-Cell-O Way Machines, or write today for Bulletin 31631.



Close-up view of the cross-feed head on the spindle. It carries three tools for boring, counterboring, and grooving the heavy gun part in an automatic work cycle.

EX-CELL-O

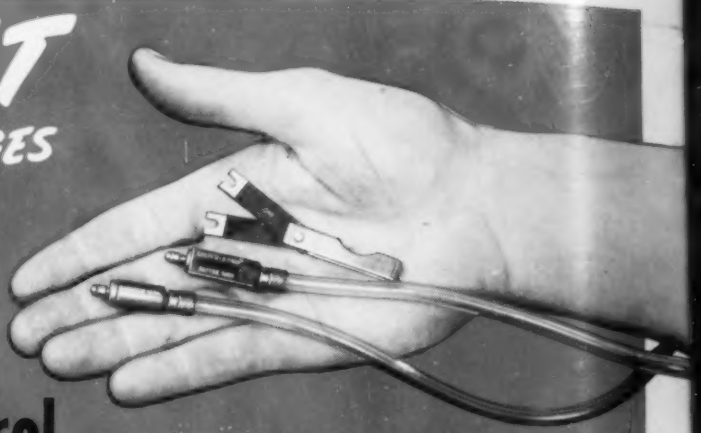
CORPORATION

DETROIT 32, MICHIGAN

MANUFACTURERS OF PRECISION MACHINE TOOLS • CUTTING TOOLS
RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT
AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

PLUNJET
GAGING CARTRIDGES

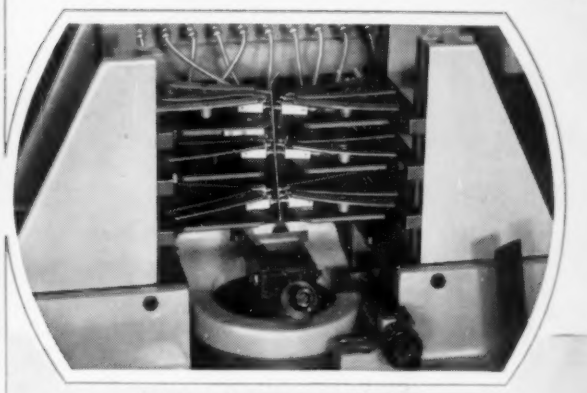
WIDELY USED
For Inspection and Machine Control



The Plunjet is made with both rectangular and cylindrical short and long housings.



Plunjets with Precisionaire for checking jet engine blades.



Jet blade fixture using Plunjets.

PLUNJET GAGING CARTRIDGES . . . the self-contained gaging heads you can use practically everywhere, were developed by Sheffield in 1949.

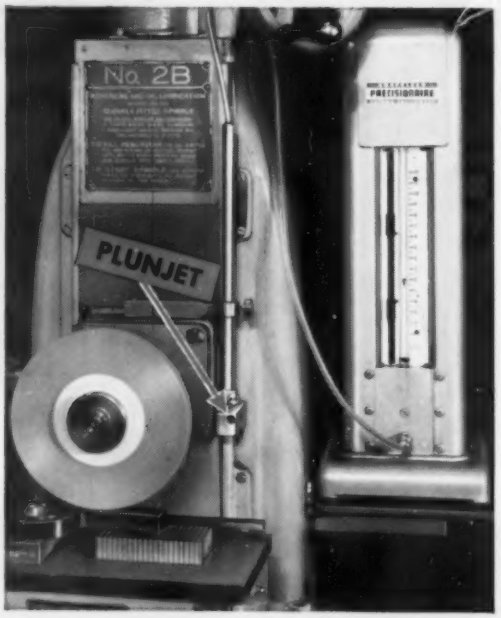
THOUSANDS ARE NOW IN USE on a wide variety of gaging fixtures and machine control applications.

MORE THAN FIVE THOUSAND are used on gages for checking jet engine blades.

PLUNJET GAGING CARTRIDGES ARE STANDARD LOW-COST STOCK ITEMS which can be applied by users to practically any gaging fixture or machine tool control where indication is required.

***WRITE FOR ENGINEERING DATA** giving ranges, amplifications, applications, mounting dimensions and prices.*

IMMEDIATE DELIVERY FROM STOCK



Plunjet feed gage enables operator to grind to a degree of accuracy previously impossible.

6302

SHEFFIELD HEADQUARTERS

the **Sheffield** corporation

DAYTON 1, OHIO, U.S.A.

GAGES • MEASURING INSTRUMENTS • MACHINE TOOLS • CONTRACT SERVICES
THREADING TOOLS

